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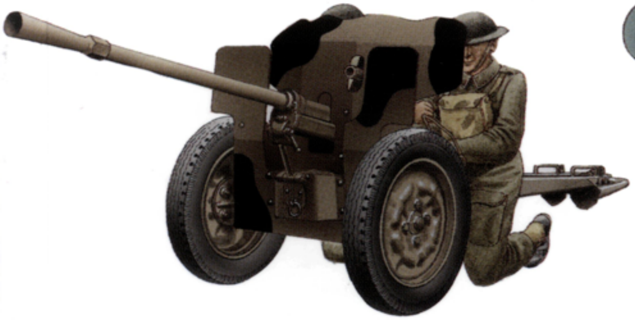

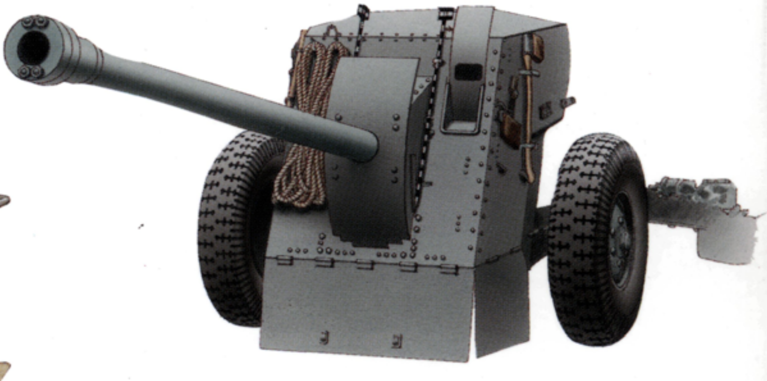

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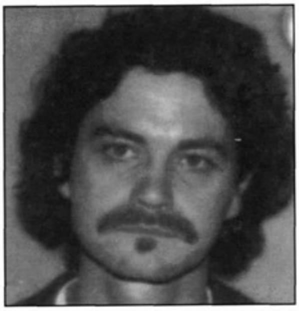
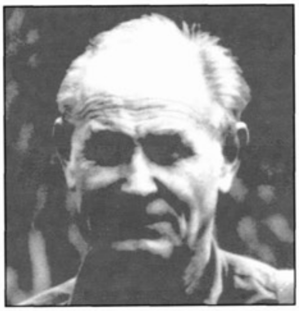


CHRIS HENRY has been interested in military history since he was a small boy. His interest in artillery developed during his time as a volunteer worker at the Tower of London, and he became Senior Curator at the Royal Armouries Museum of Artillery at Fort Nelson. Formerly the Head of Collections at Firepower!, the Museum of the Royal Artillery, he is now Curator of Explosion!, the Museum of Naval Firepower at Priddy's Hard, Hampshire.



BRIAN DELF began his career working in a London art studio producing artwork for advertising and commercial publications. Since 1972, he has worked as a freelance illustrator on a variety of subjects including natural history, architecture and technical cutaways. Some of his recently illustrated books have been published in over 30 countries. Brian lives and works in Oxfordshire.

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Brian Delf, 7 Burcot Park, Burcot, Abingdon, Oxon, OX14 3DH

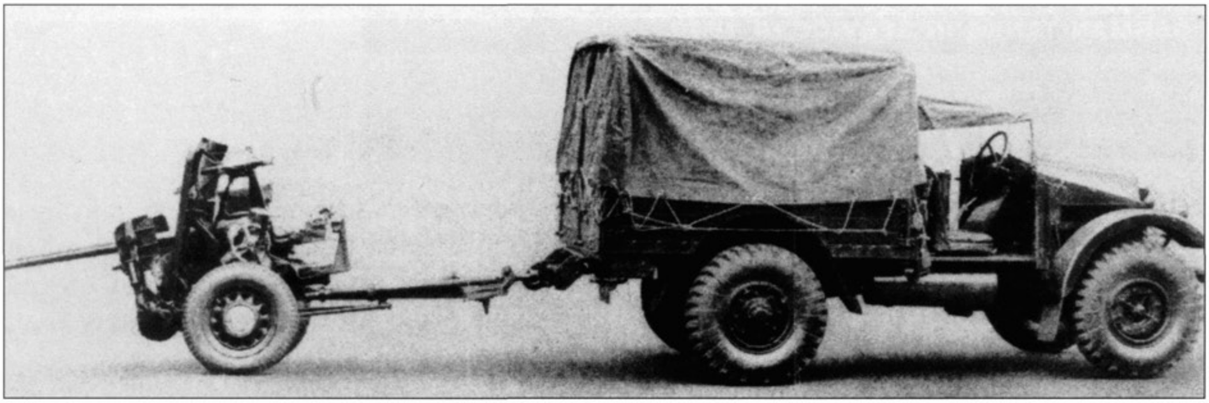
The Publishers regret that they can enter into no correspondence upon this matter.

BRITISH ANTI-TANK ARTILLERY 1939–45

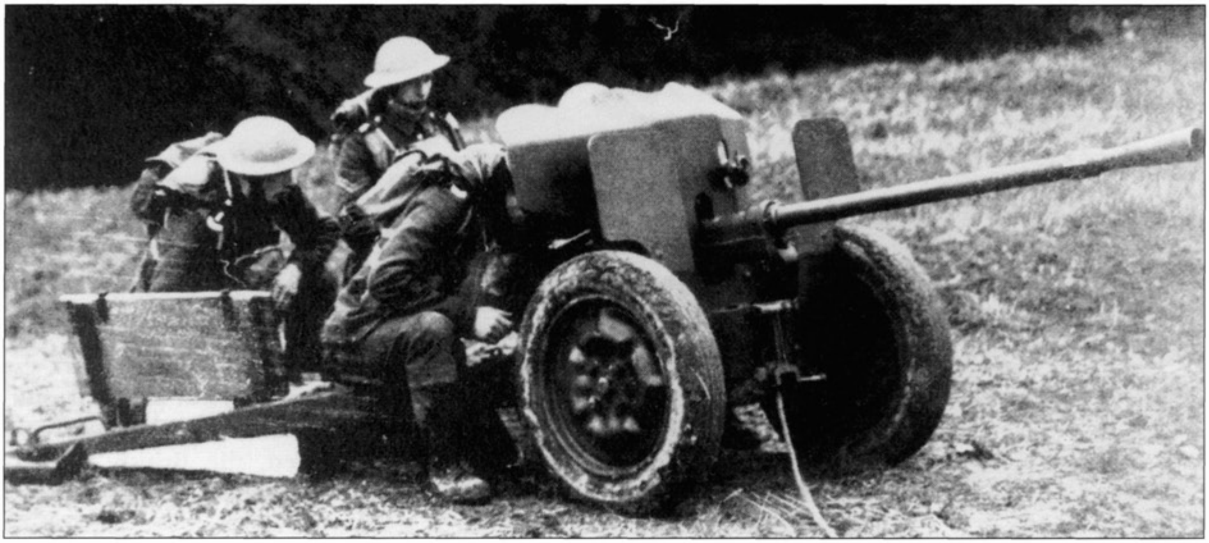
INTRODUCTION

On 31 January 1943, during the battle of Kasserine in Tunisia, the 72nd Anti-Tank Regiment had two troops of 6-pdr anti-tank guns deployed on a hillside and wood either side of the Robaa road. During the short vicious attack that occurred, the British gunners destroyed two Tiger tanks and four Panzer IVs. The judicious siting of their guns and the element of surprise gave them victory over one of the most feared and powerful German tanks, the Tiger, introduced in 1943. This was just one of thousands of encounters between armour and anti-tank weapons during the Second World War. It demonstrates that, although between 1916 and 1939 the tank had rapidly become one of the most powerful threats on the battlefield, it could now be dealt with not only by other tanks but also by weapons that could be operated by infantry or artillerymen. Numerous portable anti-tank weapons existed for the infantry but it was the high-powered, concealed, anti-tank gun, used with the right tactics, that could almost always be successfully relied on to defeat armour.

The main principle upon which the anti-tank gun worked during most of the Second World War was that the maximum amount of kinetic energy had to be concentrated on the smallest surface area of the armour being attacked. In the 19th century manufacturers of guns and ships' armour vied with each other to produce the most powerful gun or the toughest metal armour to defend against it. By the time of the Second World War it was not the ship that was to be defended but the tank. This constant battle of offensive and defensive technology continued throughout the war and led to a whole new way of destroying, and therefore defending, armour. An anti-tank gun is a high-velocity weapon. It fires on a flat trajectory and is meant to give a crippling or



The 2-pdr gun on Mark II carriage in travelling position being towed behind an 8cwt truck. (Courtesy Royal Artillery Historical Trust)



The Hotchkiss 25mm gun deployed by the BEF in training before departing to France in 1940. (Royal Armouries Thurston Collection, Courtesy of Trustees of the Royal Armouries)

killing blow to the target. If this does not happen then the gun has to be able to reload quickly. It also has to be light enough to be manhandled and has to have a low silhouette so that it is not easily detected.

The German Army had had first-hand experience of defending against tanks at the end of the First World War and this fostered the notion that the field gun was the antidote to the tank. Infantry-manned field guns accounted for a large proportion of the British tank casualties and, as well as developing the anti-tank rifle, the Germans developed field guns that could counter tanks. The idea that the anti-tank gun was primarily an infantry weapon was born. The inter-war period saw a great deal of experimentation with armoured fighting vehicles and their corresponding guns, but very little practical experience on a large scale was to be had. It was not until the Spanish Civil War that the effects of small-calibre anti-tank guns were to be seen. Even then the lessons were somewhat dubious because most anti-tank guns saw more use as infantry field guns in an extempore role.

Normally, the main target of an anti-tank gun was indeed the tank, which varied in size and armour thickness, but a look at German armour thickness in 1940 will give us some idea of what British anti-tank guns were up against:

GERMAN TANKS IN SERVICE IN 1940

Armour	Front	Side	Turret front	Turret side
Pzkfw III	2.8in.	1.2in.	2.24in.	1.2in.
Pzkfw II	1.2in.	.6in.	1.2in.	.6in.
Pzkfw I	.51in.	.51in.	.51in.	.51in.

The main British anti-tank gun at the beginning of the war, the 2-pdr, was already obsolete and was due to be replaced by the 6-pdr or 57mm gun. In 1943 the 17-pdr gun replaced the 6-pdr and finally the monster 32-pdr gun was the final step in the conventional towed anti-tank gun series. Ever-increasing vehicle armour forced gun designers to provide bigger and bigger high-velocity guns. Their recoil made them difficult

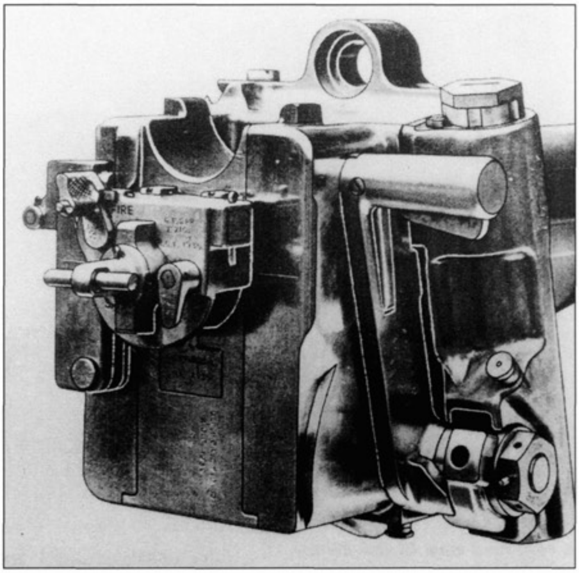
A very nice view of the 25mm Hotchkiss anti-tank gun being loaded onto a 15cwt truck. This gun appears to have no flash eliminator on the muzzle; normally a cone-shaped eliminator was fitted. The Bedford MW 15cwt truck was the standard vehicle for the 25mm and Bofors guns of the Royal Artillery. (Courtesy RAHT)

to control and hence a heavier carriage was required to deploy and transport them. Some of the larger guns, such as the 17-pdr, required a large detachment to man them and the purpose of the infantry anti-tank gun was beginning to lose its original meaning: that of a small light gun that packed a powerful punch. The saviour of the anti-tank principle came in the form of the chemical energy warhead. Ammunition was extensively experimented with, so much so that by the end of the war many weapons had become based on a hollow charge principle. This led back to the original concept of the light anti-tank weapon, and the development of Burney's recoilless weapons at the end of the war proved that small, light guns could be developed that could attack heavy armour. This idea was later adapted to provide a light anti-tank weapon of the Battalion Anti-Tank (BAT) series after the Second World War.

DEVELOPMENT

The story of British anti-tank weapons really begins with the 2-pdr gun. Envisaged as a reliable weapon with no need for replacement it became quite obvious that the 2-pdr was rapidly to become obsolete when faced with German armour in France in 1940. The 2-pdr gun had a muzzle velocity of 2650ft/sec enabling it to penetrate 1.65in. of armour. On paper the 2-pdr could deal with light German tanks, and possibly with the Panzer III in the right conditions, so at the beginning of the war the gun was considered to be a useful weapon for the Army. Because of a chronic shortage of guns, French and Swedish anti-tank guns were supplied as a stopgap measure but the only real answer was a larger-bore, high-velocity gun.

Between the wars Britain, as well as every other European country, agonised over the best way to deal with the mechanised threat. The internal combustion engine had given all armies the ability to move their guns and equipment quickly and this in turn enabled various countries to refine their designs of tracked armoured fighting vehicles. Guns had to be developed that could not only destroy tanks but that could withstand the higher speeds and the damage that might be sustained as



The 2-pdr breech showing the striker case and operating lever. The striker case was the assembly that held the firing pin and could be removed to disable the gun. (Courtesy of RAHT)

a result of the greater forces acting on them when travelling on a metalled road. As late as 1934 Britain was still discussing the options. At this time a gun was required that could replace the 3-pdr tank gun. Tank armament and its antidote, the anti-tank gun, were seen as items to be produced together. For manufacturing purposes much of the discussion about anti-tank weapons included the need to be able to arm tanks with the same weapon. It is worth reiterating that the procedure that produced a new weapon was complicated by the fact that there were several committees and organisations involved. Between 1919 and 1936 the Master General of the Ordnance was responsible for design of munitions for the Army and the Director of the Royal Artillery, who was responsible for the design of equipment, assisted him. In 1924 the Ordnance Select Committee was the body reconvened to research the materials and designs required for ordnance and ammunition and therefore the committee consisted of senior Army and naval personnel as well as a representative of the Royal Air Force. It was able to call upon the services of the Royal Ordnance Factories and also of private companies, normally at this time Vickers-Armstrong Ltd, who had very close connections with the government. In addition to the Ordnance Committee there was the Royal Artillery Committee which reviewed Royal Artillery equipment and its performance. According to the distinguished author B. P. Hughes:

> Its Chairman was either President or Vice President together with two other members of the Ordnance Committee and a permanent Secretary. Ex-officio members were selected by virtue of the appointments they held and were normally the commandants of artillery schools, heads of technical departments and regimental officers who represented the particular branch of the regiment under discussion.

The discussions about anti-tank weapons were therefore carried on at various levels but in early discussions in the Committee of the Imperial General Staff, the Director, Royal Artillery, suggested that a high-velocity gun with about 1,000yds range was required for anti-tank work. The resulting 50-cal. gun was accepted in 1935 for both purposes. During this period it was common for the Superintendent of Design and a commercial company, nearly always Vickers-Armstrong, to work closely together to create pilot equipments for testing. The Superintendent of Design was the leader of the Design Department, which had been conglomerated from the Royal Gun Factory, the Royal Carriage Department, the Royal Laboratory and the Royal Small Arms Factory and was based at Woolwich in London.

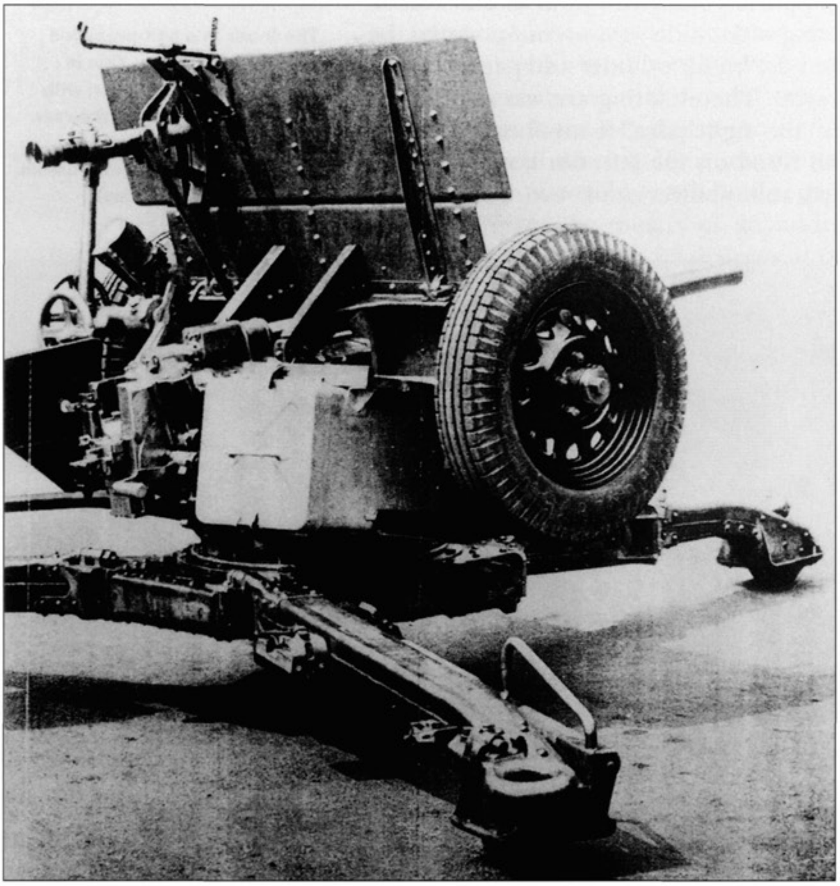
Two prototype carriages were produced for analysis, one by Vickers-Armstrong and the other by the Design Department. The design produced by Vickers became known as the Ordnance 2-pdr on Mark I carriage. Both prototypes were sent to Shoeburyness in Essex for firing evaluation and they were later tested very severely in front of the General Staff. By December of the same year a decision had been made about the feasibility of production and it was the Vickers gun that was considered to be the easiest to manufacture. An order was placed with them for 44 guns.

Even so, the Woolwich Design Department persevered with its design and the effort proved to be worthwhile because the design was further evaluated in June 1936. It was often the case that comments on improvements were taken into account, especially those of the Royal Artillery Committee, who were the users of the guns, and they considered the Woolwich design to be an improvement over the Vickers concept. The Woolwich design became the 2-pdr carriage Mark II which was the most widely produced model and Vickers were eventually given an order for 812 units of the improved design.

THE 2-PDR

The gun

The gun barrel itself was known as the 2-pdr Mark IX. It consisted of an all steel autofrettaged barrel and removable breech ring and used a vertical sliding breech block similar to that used on the Hotchkiss 6 and 3-pdr naval guns. The gun was designated the Mark IX since previous 2-pdrs in government service were naval and the Mark VIII was widely in use. In order to fit the breech ring to the barrel, threads on the barrel were provided so that an eighth turn of the ring secured it to the barrel. The barrel itself was fitted with guides to allow the gun to be fitted easily to the cradle.

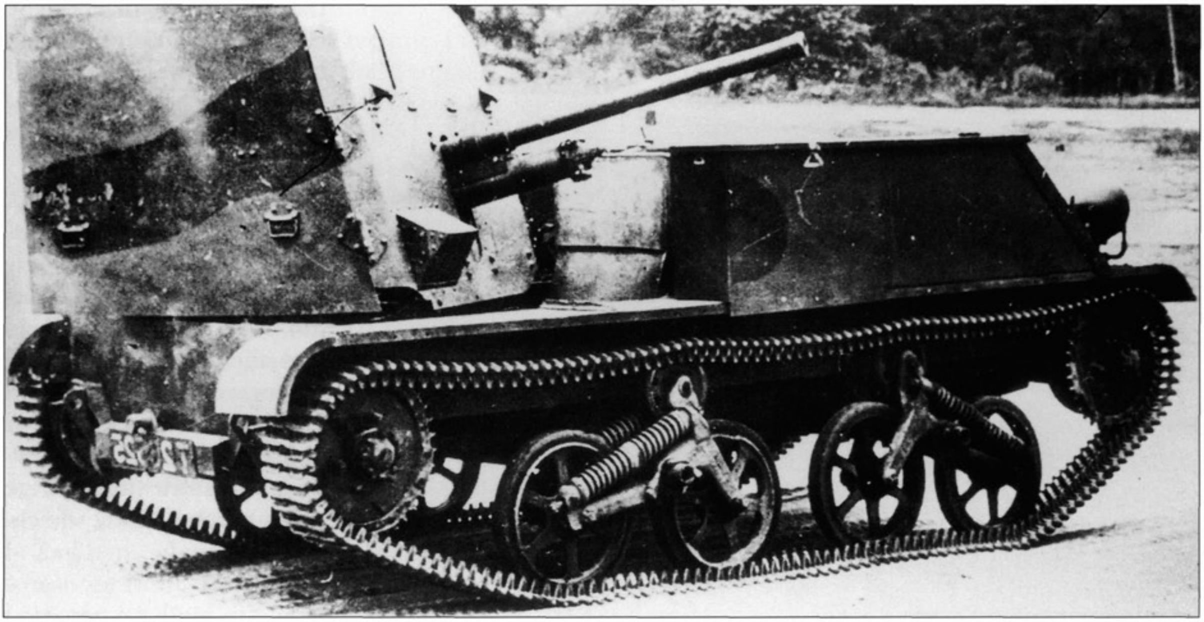


A close-up of the 2-pdr Mark I carriage rear right-hand side showing ammunition box and rear right trail leg. This image shows the carriage fitted with pressed steel wheels but an earlier spoked variety were also in use. (Courtesy of RAHT)

The carriage

The carriage of the 2-pdr altered somewhat over its life. The Mark I carriage had all-round traverse with 15 degrees of elevation and 10 degrees depression. It consisted of a firing platform, axletree (a tranverse beam support) body, wheels, carriage body, cradle and associated components, and a shield. The Mark I carriage was quite different from the Mark II although it appeared visually similar. The platform consisted of a body constructed of steel channel sides with top and bottom plates and incorporating a socket for the carriage pivot. The platform incorporated three legs, one front and two rear. The front leg was unfolded and locked in its extended position and the rear legs were splayed into position and then held by two stops. Each leg was fitted with a fixed spade and the rear legs had lifting handles and handspike sockets. The wheels were mounted upon an axle that was rotatable and swung up into a position in front of the gun shield when the three legs were let down into the firing position. The shield itself was flat and the upper portion was deeper than in the Mark II. The lower section was of smaller width to incorporate the wheels but it was not shaped, being made of flat-section plate. The legs themselves were of a pressed steel construction and originally in the prototype had screw-down jacks that could be used to level out the gun. They were of little value if the piece had to be deployed quickly, although the gun could be fired from the wheels with just the trail leg out. To the left side of the gun an elevating gear worm case, brackets for the travelling lock and foot pedal, and elevating and traversing gears were fitted. A quadrant degree scale was fitted to the cradle and could be read through 0–15 degrees elevation and 10 degrees depression. On the right-hand side of the gun were brackets to support the ammunition locker. The front transom had depression stops fitted and there was a travelling lock bracket to steady the gun when in transit.

The 2-pdr Mark I cradle was supported by its trunnions in brackets on the carriage body. A central opening with guide ways accommodated the gun slide, two upper bands secured the buffer cylinder and parallel lower cylinders received two spring presses. The elevating arc was secured on the underside and a bracket for the sight parallel motion link and a quadrant degree scale reader was fitted on the left. On both guns, the recuperator consisted of a hydraulic buffer and two running-out

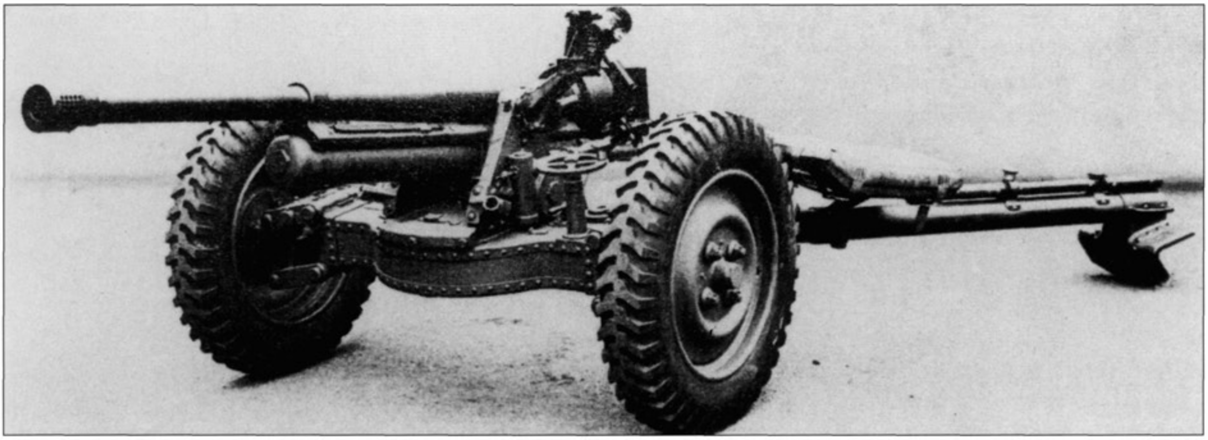


The 2-pdr in a self-propelled experimental guise. This is the Lloyd carrier version with an armoured turret at the rear. (Royal Armouries Thurston Collection, Courtesy of Trustees of the Royal Armouries)

cylinders containing springs. The buffer consisted of a cylinder in which there was a hollow piston over a hollow control plunger. The cylinder itself was provided with a filling plug and a spring-loaded snifting valve to release imprisoned air. The running-out presses consisted of two parallel cylinders containing three spiral springs with parting and end-bearing plates. It was introduced into service in 1936 and at the time was considered to represent the state of the art. As early as 1939, gunners recognised that the regular shape of the shield and the height of the carriage meant that the gun was far too prominent on the landscape to be concealed for long. In comparison to the German 37mm Pak 39, which had a low silhouette, the gun was very difficult to conceal. It was suggested that the shield be altered so that its lines were irregular but this principle was applied to the 6-pdr and not the 2-pdr.

The gun on the Mark II carriage was tripod-mounted with folding legs of box section steel plate, two of which were pushed up against the shield so that it could be towed. The remaining leg was fitted with a tow eye for transportation. Both of the wheels were fitted with stub axles machined into a Morse taper (a very finely machined tapered spigot). They were locked into corresponding sockets and a lever next to them enabled them to be unlocked and moved quickly when brought into action. Instead of jacks the legs ended in feet that had pickets extending through them to get purchase on the ground. The Mark II could also be fired from the wheels but dropping them to the ground using the quick release mechanism was far easier than the manoeuvring required in the Mark I carriage. The traverse was 360 degrees since the gun recuperator, barrel and shield were all mounted upon a turntable on the platform. Traversing could be done to fine or rough speed. Traversing gear on this carriage was of a two-speed type operated from the left side of the carriage. It consisted of a grooved hand wheel attached to a shaft-engaging bevel gearing. This transmitted motion through a worm gear to the pinion traversing rack. In fast gear the worm was disengaged and the drive given by means of an additional bevel gear. The carriage allowed a depression of 13 degrees as opposed to the 10 degrees of the Mark I.

The recoil system of the Mark II carriage was a similar buffer/recuperator arrangement to that on the Mark I carriage and consisted of a cylinder with piston and control plunger and a non-return valve,



The Bofors 37mm anti-tank gun without its shield. The gun was supplied with a long overlapping shield that entirely covered the front of the gun and the wheels. (Courtesy RAHT)

stuffing box and gland, rear plug and run-out adjusting valve. Three springs were used, of rectangular section, in order to run the gun back into position. The gun could be fired from any one of three positions using either a foot pedal at the bottom left of the shield, a hand lever near the left trunnion or a lever at the left of the cradle.

There were also further marks of barrel, which extended the range to the Mark IXA and Mark X. The difference between the Mark IX and X guns was only that the Mark X was made of higher-yield steel and was not autofrettaged, making it easier to manufacture. In order to differentiate, the guns were marked on the breech ring on the upper face with the words 'Q.F. 2-pr. Mark IX' or 'Q.F. 2-pr. Mark X' as appropriate and the right-hand side rear of the face normally had the contractor's initials, year of manufacture and serial number marked on it.

Details for the barrel were as follows:

2-PDR OF 3CWT MARK IX	
Weight including breech	2cwt 2qr 7lb
Total length	81.95in.
Bore:	
Calibre	1.575in.
Length in calibres	50 calibres or 78.75in.
Chamber length to base of projectile	11.068in.
Total effective capacity	24cu. in.
Maximum range	8,000yds
Penetration	42mm/1,000yds
Rifling:	
Polygroove plain section of 65.84in. and a uniform twist of one turn in 30 calibres. There were 12 grooves of 0.0156in. which were 0.322in. wide	
Total equipment weight	1,757lb/1,102kg

The life of the 2-pdr gun was extended by the introduction of the Littlejohn adaptor. This taper bore device was the invention of a Czech designer known as Janacek and, in collaboration with British Small Arms, it was fitted to the muzzle of the 2-pdr but was a smooth-bore end piece. This adaptation became known as the Mark XA gun.

Self-propelled versions of the 2-pdr

Many experiments were carried out to try to fit the 2-pdr onto a small tracked vehicle. Both the Bren and Lloyd carriers were light armoured fighting vehicles that with some alterations could be adapted to carry a 2-pdr gun. Vickers first attempted this in 1935 but attempts to produce a government version were not considered until 1937. The first version consisted of a 2-pdr with an armoured shield mounted in an armoured machine-gun carrier. The gun faced forward but the rear of the gun mounting was open, as was the rear of the vehicle. The gun could only traverse 20 degrees either side of the centre line. The problem of limited traverse was to some degree improved by the introduction of the 2-pdr mounted in a Lloyd carrier and known as the Stacey Lloyd mounting or officially the Carrier 2-pdr mounting Mark I. In this case, the engine was moved forward to make room at the rear for the gun mounting. The original Vickers design was an open platform and neither vehicle was thought to be worth producing for the Army.

VARIATIONS OF THE 2-PDR ANTI-TANK GUN

Mark IX	Original design development model
Mark IXA	Simplified production model
Mark X	As Mark IX but non-autofrettaged
Mark XA	As Mark X but with lower tolerance in manufacture and Littlejohn adaptor

VARIATIONS OF THE 2-PDR CARRIAGE

Mark I	Original design of carriage with box section legs and folding wheels
Mark II	Commonest carriage design with removable wheels and redesigned trail spades and shield
Mark IIA	Manufactured of steel stampings with certain features embodied in the stamping. The degree stay reader, closing plate, strengthening plate and outer steel stays were newly designed
Mark III	Design incorporating a new axletree (No. 375 Mark I), cross-springs, bumper pad and bracket, stub axle brackets, mud scraper and wheels (No. 31 Mark I instead of No. 8 Mark I)
Mark IIIA	Mark III with the stamped version of the carriage, basically the IIA but with the Mark III modifications

Other small-bore guns in the British Army

There were two further small-bore guns at the beginning of the war that are worth mentioning since they were bought as an expedient. It was clear that re-equipping the Army with anti-tank guns would require more than the 2-pdr and so the Swedish Bofors 37mm and the French Hotchkiss 25mm mle 1934 anti-tank guns were brought into service to make up the shortfall. It has become fashionable to dismiss the 25mm Hotchkiss gun as useless because it was not able to stand up to German tanks in 1940, but, with its muzzle velocity of 918m/sec, it was a respectable weapon that simply had a small projectile. For dealing with armoured cars it was adequate and at the beginning of the war it was

Gunners of the 64th Anti-Tank Regiment with a 6-pdr in the Medejez sector of Tunisia in 1942. (IWM)

obviously considered suitable. The gun continued to be used by the French long after it was abandoned by the British Expeditionary Force and it eventually found its way into fortifications and static defences.

The 37mm Bofors gun was a far more useful weapon and was critically used by the 1st and 2nd Batteries of the 106th Regiment (Lancashire Yeomanry) Royal Horse Artillery. At the battle of Beda Fomm on 5 February 1940 nine (later 11) guns of these two batteries were mounted on 15cwt trucks against Italian tanks about 60 miles south of Benghazi. In a running battle at very close range the guns destroyed many Italian tanks and vehicles attempting to counter-attack. The *Royal Artillery Commemoration Book* states:

> One of the Bofors covering the road got a shell through the shield which killed the layer and wounded the rest of the detachment. The gun itself was removed and found serviceable and did good work in the dawn battle later.

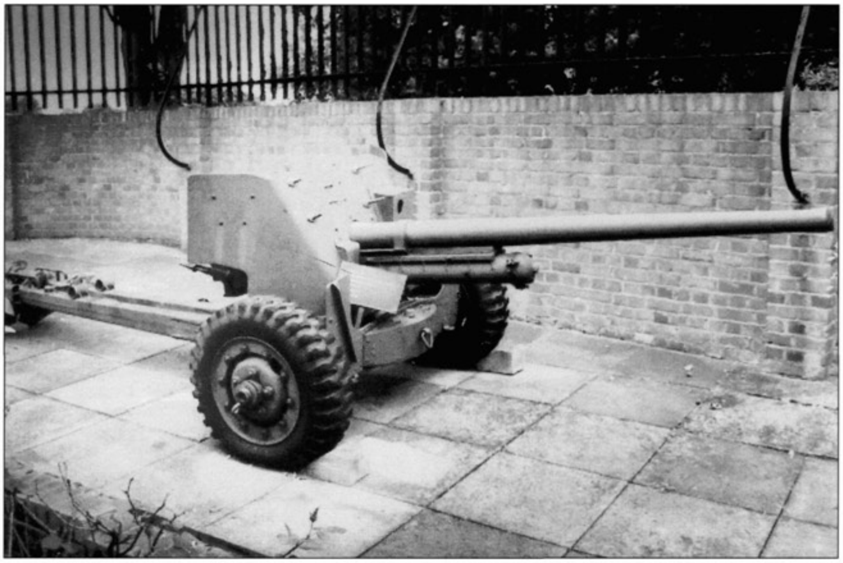
This says a great deal about the robustness and reliability of the Swedish guns and it appears they were well liked by their crews.

THE 6-PDR

The 6-pdr was first designed in 1938 as a replacement for the 2-pdr (40mm) tank/anti-tank gun. However, its introduction was delayed by the losses of the British Expeditionary Force in 1940, which led to a decision to continue the production of the 2-pdr for longer than planned in order to rebuild the numbers of guns. By way of an explanation, at least 502 anti-tank 2-pdr guns and 98 25mm guns were lost in France. In 1942 the 6-pdr anti-tank gun was introduced into the British Army and fought in most of the battles of the Western Desert campaigns of that year. Alongside it the 2-pdr continued to be produced because the 6-pdr took such a long time to come into production.

The gun

The need for a more powerful anti-tank gun than the 2-pdr was realised at the beginning of the war and designs were immediately put forward for a 6-pdr of 57mm calibre. In this case the Mark I gun was manufactured but was immediately declared obsolete and the Mark II gun was introduced in November 1941. The Mark II barrel was the anti-tank gun version whilst the Mark III was intended for tank use and was manufactured with

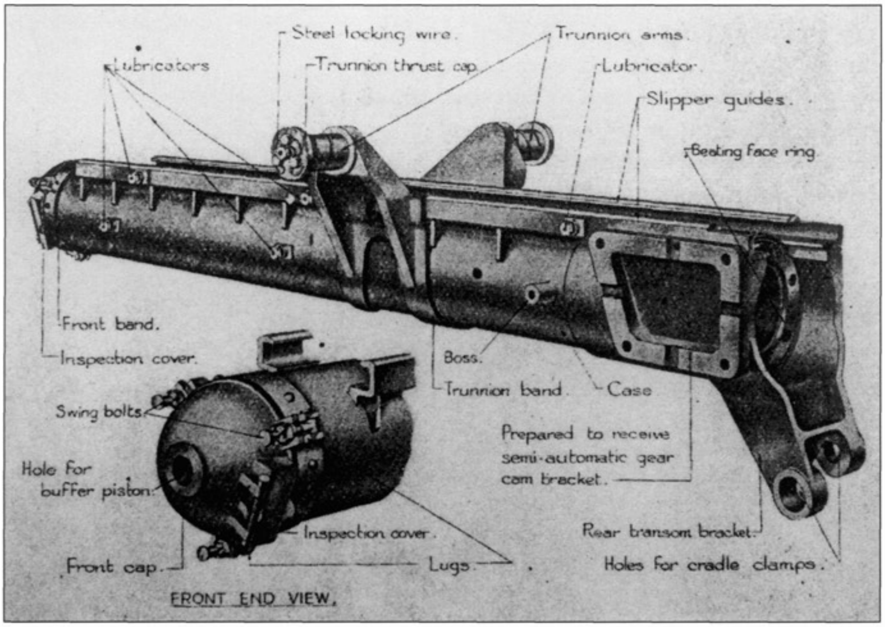


The American 57mm anti-tank gun M1, a direct relation to the 6-pdr. (Courtesy RAHT)

lugs that would fit a tank mounting. At the beginning of the war the United States was using a 37mm anti-tank gun not dissimilar to the German weapon. As it soon became obvious that the 37mm was unable to cope with German tanks, the United States cast around for another larger calibre weapon and decided to adopt the British 6-pdr. In February 1941 the British provided the Americans with the means to construct the gun but all fittings were to be manufactured using American standard engineering sizes and hence the gun became known by the American designation 57mm M1.

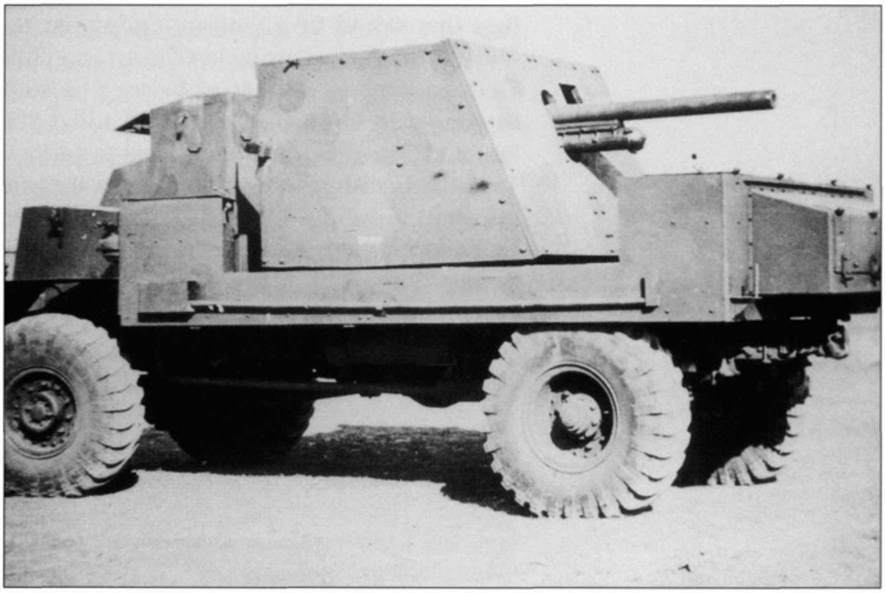
6-PDR OF 7CWT MARK II	
Weight including breech	6cwt 3qr 12lb
Total length	100.95in.
Bore:	
Calibre	2.244in.
Length in calibres	43 calibres (approx) or 96.2in.
Chamber length to base of projectile	16.2in.
Total effective capacity	100cu. in.
Maximum range	5,500yds
Penetration	74mm/1,000yds
Rifling:	
Polygroove plain section of 71.18in. and a uniform twist of one turn in 30 calibres. There were 24 grooves of 0.02in. depth and 0.22in. width.	
Total equipment weight	2,521lb/1,581kg

The gun consisted of a barrel and removable breech ring with left and right actuating bushes (gun metal rings that surround a shaft), two Tecalemit lubricators; T 46, a firing lever support plate, breech ring-securing screw, four support plate-securing screws, firing lever axis stud and other smaller fittings. As with the 2-pdr, it was fitted with slides that allowed it to recoil along slipper guides on the cradle and it used a similar recoil system. What is interesting about the development of the 6-pdr barrel is a memorandum of October 1941 that recommended the adoption of a muzzle brake for the 6-pdr barrel. Experiments with captured German anti-tank guns and experience during the first two years of war showed that the German design of muzzle brake improved the performance of the gun. The design was therefore actually



A photograph taken from a contemporary handbook showing the recuperator and slide of the 6-pdr gun. The gun recoiled along the top slides of the cradle every time it was fired but was restrained by the buffer recuperator. (Author's collection)

adopted by the Ordnance Select Committee. Eventually this alteration became the 6-pdr Mark IV that had a longer barrel and the German-style muzzle brake.



The Deacon 6-pdr self-propelled gun. This consisted of a 6-pdr mounted upon an armoured AEC Matador truck. (Courtesy Trustees of the Royal Armouries)

The carriage

The 6-pdr Mark I carriage was a split trail design that gave an arc of traverse of 45 degrees right or left of its centre line. The gun could be elevated 15 degrees and depressed by 5 degrees. A large amount of elevation was not as critical in an anti-tank gun as it was in a field gun, because the need for indirect fire was not so acute. The elevating equipment consisted of an 18-tooth arc, worm shaft bracket, worm shaft, worm and hand wheel. The breech consisted of a sliding breech block which was a semi-automatic vertical drop design. The barrel slid along the top of the cradle and was able to recoil a full 30in. under the control of a hydraulic buffer and a spring recuperator inside the cradle of the gun. The elevating gear was on the left-hand side of the gun, as was the firing gear, which was operated through mechanical linkages to the striker case of the breech. The hand wheel faced downward and there was a shoulder pad at that side of the breech so that the gun could be traversed by pushing or pulling on the pad.

The two trail legs were connected at their front ends by a pivot socket. They could be drawn together and a rotating trail eye locked onto the left leg so that the gun could be towed. The wheels were of steel with pneumatic tyres and each side was fitted with a brake so that each wheel could be locked independently. All of the gun and cradle mechanism rested on an axletree with two stub axles for the wheels.

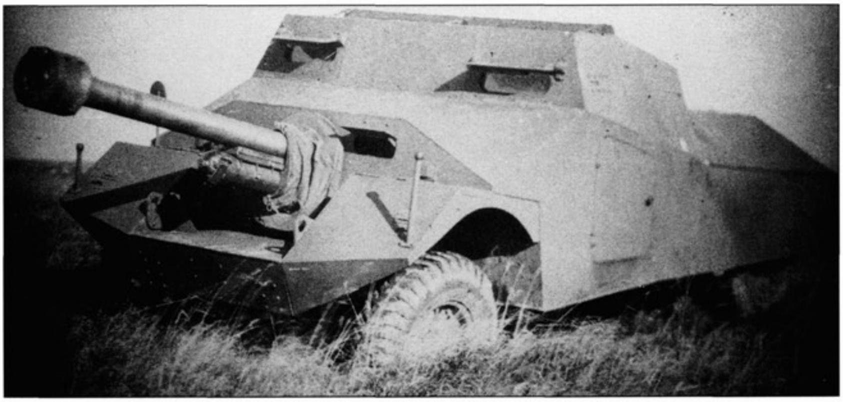
The gun shield consisted of four sections, all made of bullet-proof steel. The front of the shield had a sight box and hooks for the drag ropes. The gun was considered to have an upper and a lower shield and these were continually upgraded and modified over the gun's life.

For all-round protection the gun was provided with two large side shields that fitted around the gun. Each one had a supporting bracket to be attached to the gun but with a wheel on the opposite lower corner that enabled it to be adjusted once fitted. These shields were large and cumbersome and appear hardly ever to have been used. The *Lists of Changes to War Materiel* indicates that in April 1942 the 6-pdr carriage was to be fitted with a towing eye to the front of the carriage. This was to allow for the gun to be easily hauled up onto a 'portee' vehicle.

TABLE OF EQUIPMENT SUPPLIED WITH THE 6-PDR ANTI-TANK GUN*

Object	Number	Position on gun
Pick axe, 4½lb	1	On platform of lower shield
Spare parts box, 6pr carriage	1	Front of lower shield
Spare parts box, springs	1	Rear of upper shield
Firing bush hole	1	In spare springs box
Oil can	1	Rear of upper shield
Knee cap	1	Rear of left trail leg
Bill hook case	1	Front of lower shield
Covers:		
Gun and carriage muzzle	1	On gun and carriage. Muzzle cover kept on when not in action
Drift No. 18	1	In tool roll
Striker gauge protrusion, No.16	1	In tool roll
Engineer's Hammer, ball pein	1	In tool roll
Handspikes No. 4	2	On trail leg
Bill hook	1	In case front of lower shield
Injector lubricator	1	Rear of upper shield
Cocking lanyard, No. 4	1	In tool roll
Round greased packing 1/8in. in 8in. lengths	1	In spare springs box
Firing pin	1	In spare springs box
Split pins	35 various	In spare springs box
Taper pins	2	In spare springs box
Pliers	1	In tool roll
Compressed packing ring	1	In spare springs box
Tool roll	1	In rear of upper shield
Actuating shaft roller	1	In rear of upper shield
Drag rope (manhandling field artillery no. 2)	2	Front of upper shield
Screwdrivers	2	In tool roll
General service shovel	1	Front of lower shield
Sights	1	On carriage
Spanners	4	In tool roll
Main spring	1	In spare parts box
Firing pin retaining staples	2	In spare springs box
Sighting telescope No. 22C Mark II	1	In telescope holder on sight
Actuating shaft tommy bar	1	In tool roll
Artillery tool No. 229	1	In tool roll
Breech mechanism wrench No. 247	1	In tool roll
Fibre washers	2	In spare springs box

*This list is taken from the 6-pdr handbook but there are also stipulations that govern the number of items per battery, regiment etc.



Another form of wheeled tank destroyer was the Firefly; which was effectively an armoured car mounting the 6-pdr AT gun. (Courtesy Trustees of the Royal Armouries)

VARIATIONS OF THE 6-PDR ANTI-TANK GUN

Mark I	Development model immediately declared obsolete
Mark II	Production model of 43 calibres length
Mark III	Tank gun version with lugs to suit a tank turret
Mark IV	As Mark II but 50 calibres in length
Mark V	Tank version of Mark IV but with muzzle counterweight as used in the Achilles

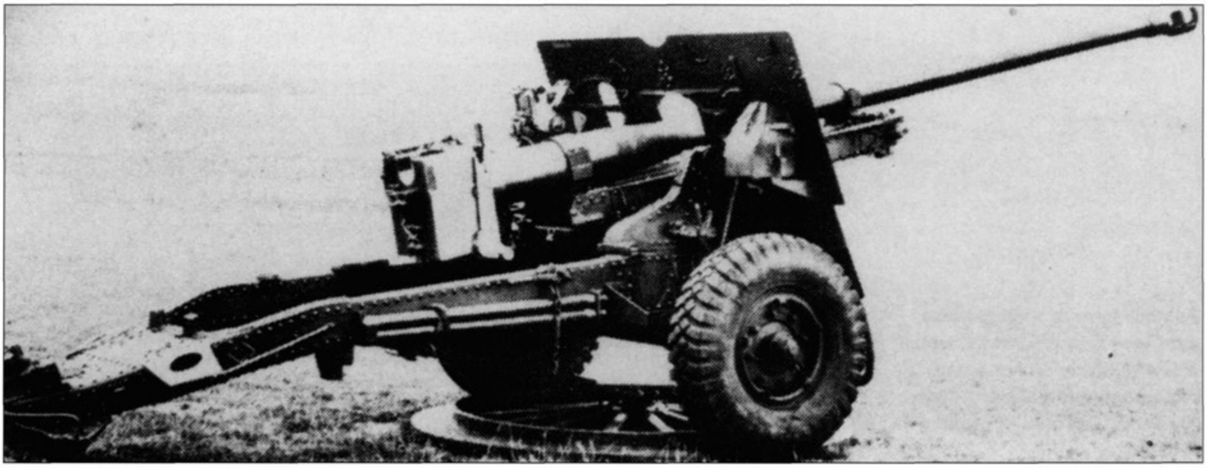
VARIATIONS OF THE 6-PDR CARRIAGE

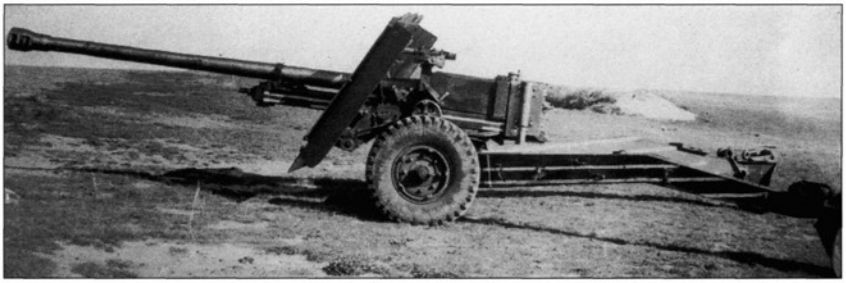
Mark I	Original design with split trail and issued with side shields
Mark II	Simplified design not adopted
Mark III	Airborne carriage lightened with the trail legs jointed so that they could be broken down. The gun had a narrower wheel track that restricted traverse to 37 degrees left and right and it had a reshaped shield

THE 17-PDR

As was stressed at the beginning of this book, the constant improvement in armour created a dynamic, which meant that as early as 1941 the need for a larger gun than the 6-pdr was understood in British military circles. On 15 April 1941 the Ordnance Select Committee met to discuss this problem at the Ministry of Supply in London. Those at the meeting were motivated by the news that the Germans had designed a 75mm gun that could penetrate 80mm of armour at 2,000yds. The design criteria were put in place at the meeting and it appeared that the gun required would need to penetrate 120–150mm of face-hardened plate at a range of 800yds. It was estimated that a 3-in. gun could defeat 150mm of frontal armour and 120mm of side armour. In theory, the projectile would need to weigh 17lb and be fired with a muzzle velocity of 2,700ft/sec. So the 17-pdr was conceived. The design process was to be convoluted and, as usual, existing designs were to be considered which, theoretically, would make the design and production faster and less expensive. The possibility of using a gun already in existence was discussed and the 3-in. or 20-cwt gun was considered and then rejected. It was therefore likely that a new 17-pdr gun needed to be designed from scratch.

A side view of the 17/25-pdr gun. The firing platform was rapidly discarded when it was found that it buckled easily on firing. (Royal Armouries Thurston Collection)





A side view of the 17-pdr gun on Mark I carriage probably deployed for a trail firing, possibly at Shoeburyness in Essex. (Royal Armouries Thurston Collection)

The 17-pdr gun came in several marks, as did the carriage. Prior to its introduction the Ordnance Select Committee stated that:

> The Board are not aware whether a second design for this equipment is required at this stage, but are of the opinion that, should the Mark I design not come up to expectations, the economical course would be to effect the necessary modifications to that design to render it suitable rather than to embark on the manufacture of a second design which could not be in production before 1943 at the earliest and which would, even then, be open to the same suspicion that attached to the first design.

Initially two variations were introduced, with characteristics as follows:

17-PDR MARKS I AND II

Weight including breech	Mark I: 16cwt 1qr 2lb Mark II: 16cwt 3qr 9lb
Length overall including muzzle brake	180.35in.
Length of barrel	172.25in.
Bore:	165.45in.
Calibre	3in.
Length	165.45in.
Total effective capacity	1353.7cu. in.
Chamber length to base of projectile	21.42in.
Total effective capacity	300cu. in.

Rifling:

Polygroove plain section of 140.24in and a uniform twist of one turn in 30 calibres. There were 20 grooves of 0.04in depth and 0.31373in. width.

Maximum penetration	231mm/1,000yds (depending on ammunition)
Weight of gun and carriage	2 tons 17cwt 1qr 25lb or 6,537lb
Maximum range	10,000yds but 4,000yds effective range (according to the handbook)

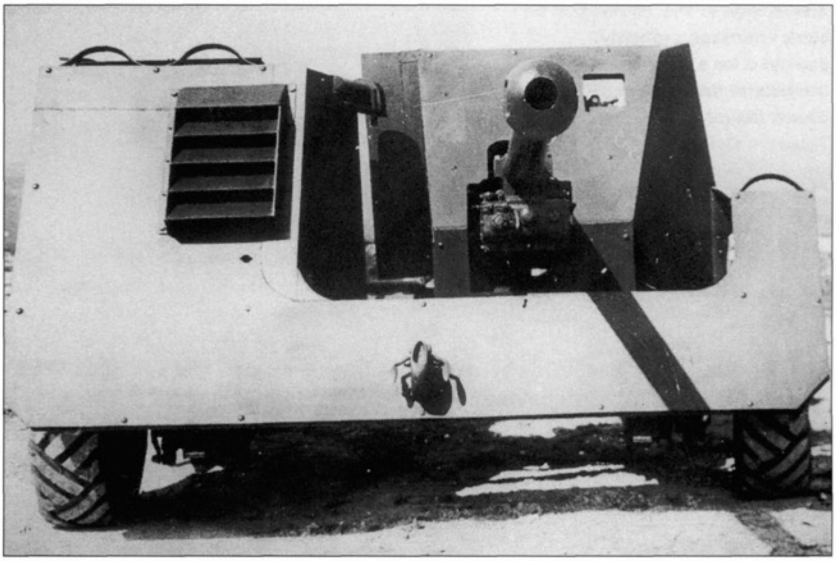
The two guns were introduced in September 1942 and both barrels were very similar. The main difference between the Mark I and II barrels was that the Mark II had additional lugs for a tank mounting and a muzzle cap instead of a muzzle brake.

The Mark I gun consisted of a barrel, breech ring and muzzle brake and could be autofrettaged. The barrel was threaded at either end so that the muzzle end took the muzzle brake and the breech end took the breech ring.

The carriage

The gun was originally mounted upon a modified 25-pdr Mark I carriage and was known as the 17/25-pdr. The gun on this carriage was known to some as the Pheasant and its trial showed it to have a slow rate of fire. This was of some concern, since the rate of fire was critical in an anti-tank gun. The trials were carried out on both this carriage and the newly designed Mark I: the gun with the 17-pdr carriage fired 176 rounds and the 17-pdr on 25-pdr carriage fired 31 rounds. A second trial was carried out and a further 130 rounds were fired with the 17-pdr on 25-pdr carriage. It was stated that the 17/25-pdr should not fire over a greater arc than 60 degrees and the firing platform should be discontinued. Tests carried out at Shoeburyness in 1942 concluded:

> There is considerable variation in the amount of jump in the two days firings and on the first day between the two series at the two elevations. A jump of –5 minutes has been recommended.



ABOVE **A front view of the self-propelled mounting known as the Straussler conversion. This consisted of a 17-pdr with an auxiliary power drive and steering system that could tow a limber and was designed by a naturalised Hungarian who also invented the Sherman DD of D-Day fame. The idea of a self-propelled gun such as this was not as odd as it may sound and post-war designs incorporated this sort of APU in Soviet and British armies. (Royal Armouries Thurston Collection)**

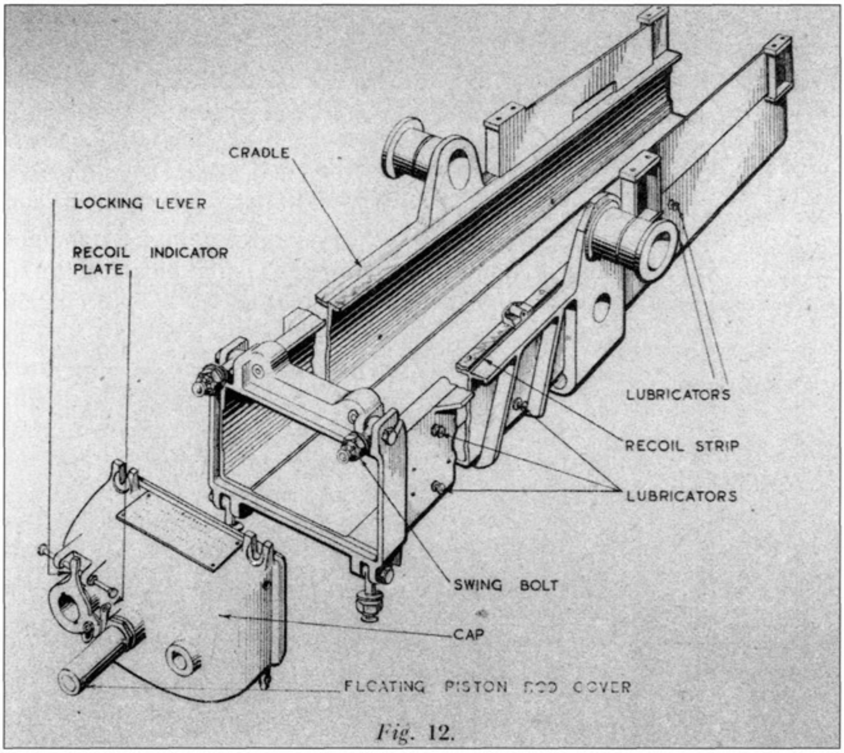


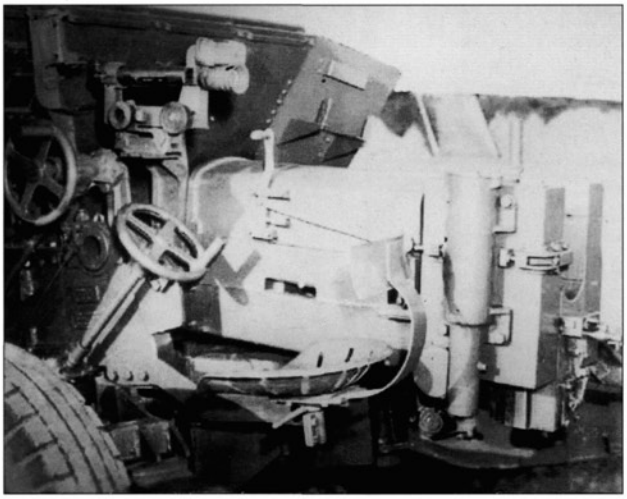
Fig. 12.

An exploded view of the 17-pdr cradle. The gun was fixed to the recoil block which moved within the cradle. This system was very similar to that on the 25-pdr. (Author's collection)

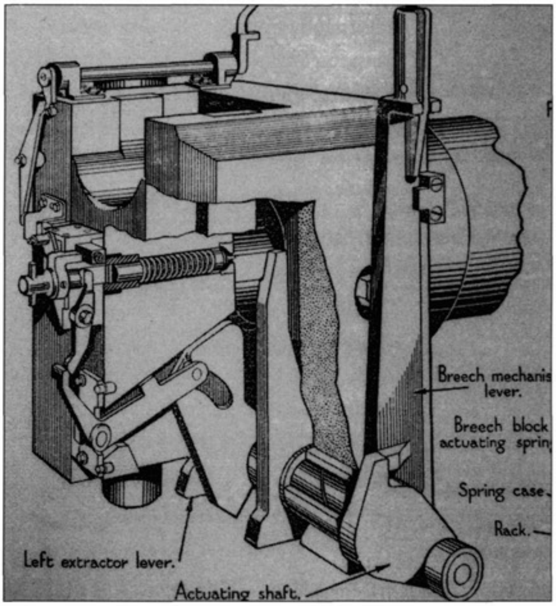
The 17-pdr Mark I gun and carriage in Italy. The towing vehicle is an M3 half-track. (Royal Armouries Thurston Collection)

The 17/25-pdr gun was initially used in the Tunisian campaign. The second, completely redesigned, carriage became generally known as the Mark I carriage. There is some confusion about the nomenclature of the 17/25-pdr and it does not become clear even in the *Lists of Changes in War Materiel and in Patterns of Military Stores*. Only a Mark I carriage is referred to. It is assumed, therefore, that this was the newly designed carriage. The Mark I carriage was converted to the Mark Iw at the end of 1944, indicating that it was fitted with the Warner electrically operated braking system. At the end of 1944, in response to problems encountered when travelling across country, the Mark I carriage shield was altered to deepen the lower flap. A second, Mark II, carriage is mentioned in early 1943 and then again in August 1943. A drawing, FL71GA, was issued and it appears that Mark I carriages were to be modified by removing the recoil system, the firing gear, the screw from the traversing stop and the top stiffening angle from the shield. They were then to have an elevation stop fitted to the rear underside of the cradle. The firing gear was to be replaced and an additional traversing stop was to be added to the right-hand side of the saddle. The 17-pdr recoil system was to be added and the gun aperture in the shield was to be extended upwards. Finally, the top stiffening angle was to be replaced with packing plates inserted between angle and shield plate.

A very good view of the layer's side on a 17-pdr gun. The sighting telescope and operating hand wheels can be seen clearly. The large lump on the rear of the gun next to the breech is a counterweight intended to give the gun better balance and control and to counter the long barrel. A gun such as this could be moved with less effort if it balanced well around the axle. Many Royal Artillery detachments were expert at knowing just where to balance the gun to move it. (Author's collection)



The most common form of carriage used during the war was the Mark I carriage. Despite the Board's expressions of satisfaction with the 17/25-pdr combination, it was a gun working on the limits of the carriage and proved to be something of a lively weapon. Constant modifications were being introduced to keep it in service. The Mark I was a very simple design and consisted of a split trail where both trail legs were cranked and the trail end spades were removable. The axletree ends of the trail legs were forked to form a hinge; forward extensions of these over and under the axletree controlled the articulation. The legs were of welded plate construction. The body of the carriage was of simple bar construction, in three parts for ease of manufacture. These were the trail hinge block, the axletree pivot and the traversing pivot. The cradle was an open type upon which the gun was directly mounted onto the recuperator block with the trunnions to the rear and cam opening for the breech on run out. The buffer and recuperator block were very similar to those of the 25-pdr but were adapted to take the 17-pdr. The shield itself was made of a double thickness of 6mm plate with side flaps for cover. The 17-pdr used the No. 51 Mark I S sighting telescope. The 17-pdr could be towed by a variety of towing vehicles. Early guns were towed by Morris 3-ton artillery tractors or American half-tracks, but later in the war, particularly in Italy, tracked vehicles, including converted Sherman tanks, were used as gun tractors.



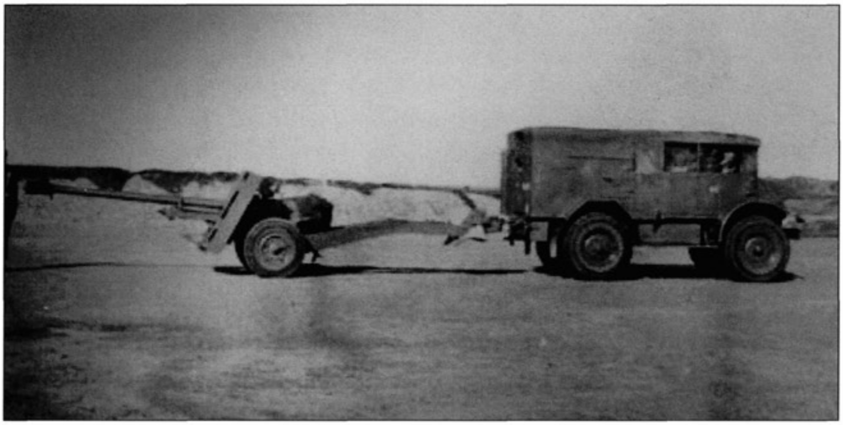
A cutaway image of the 17-pdr breech showing how the firing pin was located in the vertical sliding block. (Author's collection)

VARIATIONS OF THE 17-PDR ANTI-TANK GUN

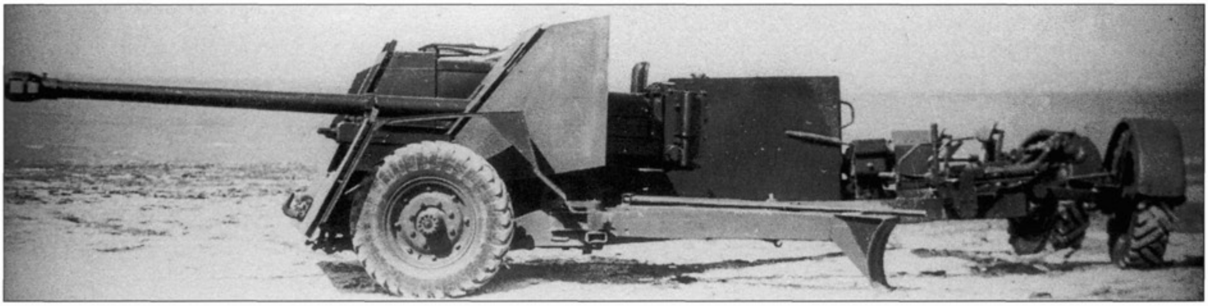
Mark I	Original design
Mark II	Tank gun
Mark III	Naval gun version, semi-automatic operation removed and used on landing craft
Mark IV	Horizontal sliding block version with modified breech ring for tanks
Mark V	Tank version of Mark V but with muzzle counterweight as used in the Achilles
Mark VI	A tank gun with shorter breech block
Mark VII	Tank gun with further breech alterations

VARIATIONS OF THE CARRIAGE

Modified 25-pdr Mark I carriage with 17-pdr barrel known as the Pheasant	
Mark I	The all-new carriage design with modified 25-pdr recuperator, split trail and double skin shield
Mark II	Standard production carriage with all welded steel fabrication but with modifications alluded to above



A Canadian 17-pdr and Ford No 8 truck. (Author's photograph)



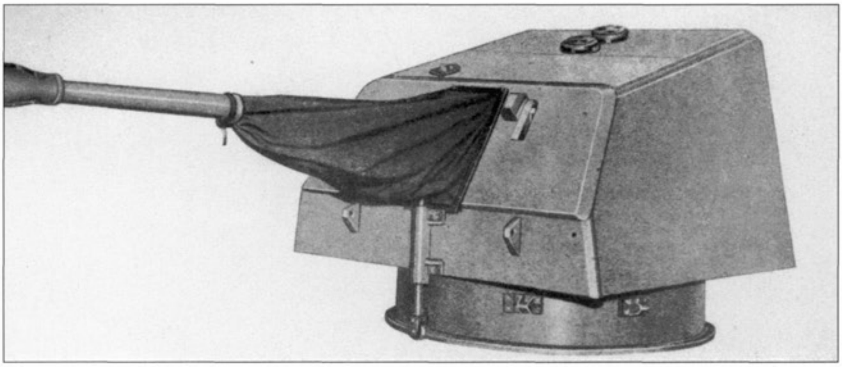
A side view of the Straussler conversion with power unit at the back. The trail legs could be demounted and although it was intended to be towed by a tractor it could be used without. (Royal Armouries Thurston Collection)

THE 32-PDR

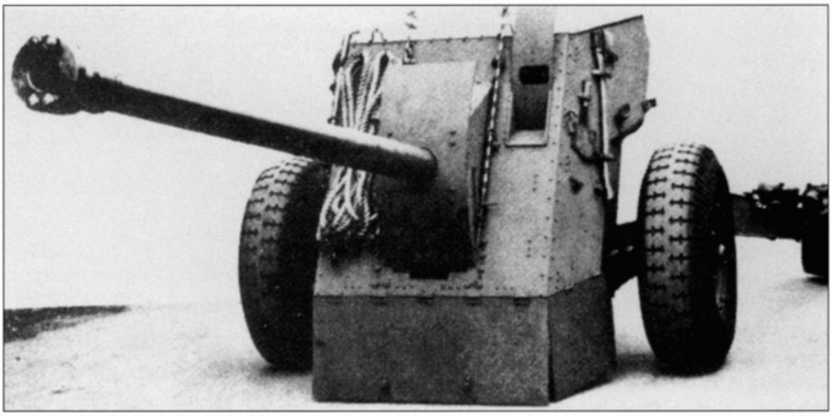
The Ordnance Select Committee was caught up in a spiral contest of creating ever-larger weapons to deal with ever-larger tanks. The 32-pdr gun was the end of the line and its development was the response to a requirement that was raised in October 1942. As usual, the final solution involved the conversion of an existing weapon, in this case the 3.7-in. AA gun, but the resulting gun and carriage were monstrously large. The proposal was to mount the Ordnance 32-pdr QF on a carriage designed by the Armaments Design Department or one designed by a Mr. Stevens, who also designed a carriage for the 17-pdr. Different muzzle brakes were considered but the Stevens design appears to have had the edge and this is the gun that can be seen at the Rotunda Museum in Woolwich today. The trail legs were of welded steel construction with removable spades that were placed on the trail for travelling. The shield was of a box construction with three fold-down flaps for protecting the lower parts of the gun. These were raised for travelling. The recoil system used a single cylinder to act as a buffer and for putting the gun into the travelling position. It was about as far as heavy anti-tank gun development went in the British services and the 32-pdr was never pressed into action, since the war ended before it was put into production.

SELF-PROPELLED GUNS

As mentioned earlier, the carriages of the 2-pdr and 6-pdr were often saved from rough terrain by the carrying of the guns on portee vehicles. These consisted of an open-backed vehicle on which the gun was positioned.



The 17-pdr Mark III gun for naval use. The weapon was used on landing craft for gunfire support. (Explosion, the Museum of Naval Firepower)



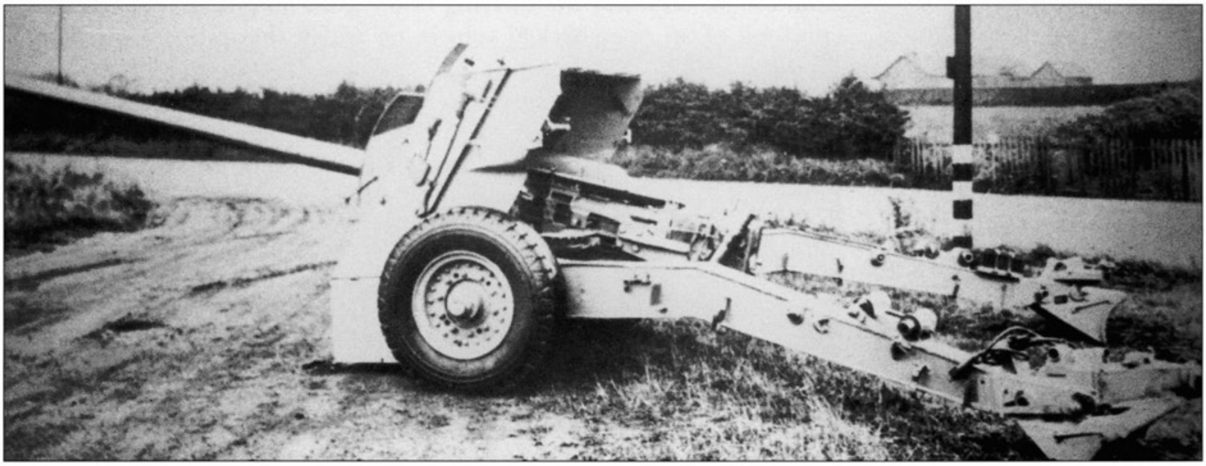
A front view of the 32-pdr AT gun with drag ropes on the shield and in the deployed position. (Royal Armouries Thurston Collection)

Several different lightweight trucks carried the 2-pdr, while the 6-pdr was carried upon the Deacon and the wheeled self-propelled Firefly (not to be confused with the British Sherman variant), both of which represented attempts to have an armoured truck-mounted gun. The first real attempt at mounting these guns on a tracked vehicle was the 2-pdr mounted on the rear of a Lloyd carrier by removing the rear superstructure of the carrier and fixing the mounting to the rear of the vehicle so that the gun was mounted upon a fixed pedestal. This was not a successful marriage and it was not until the latter stages of the war that a true self-propelled anti-tank weapon took the stage in the form of the Archer 17-pdr self-propelled gun. This was a converted Valentine tank chassis with the gun mounted in an open position in the rear of the vehicle. The gun provided a relatively low silhouette and was therefore well suited to the anti-tank role.

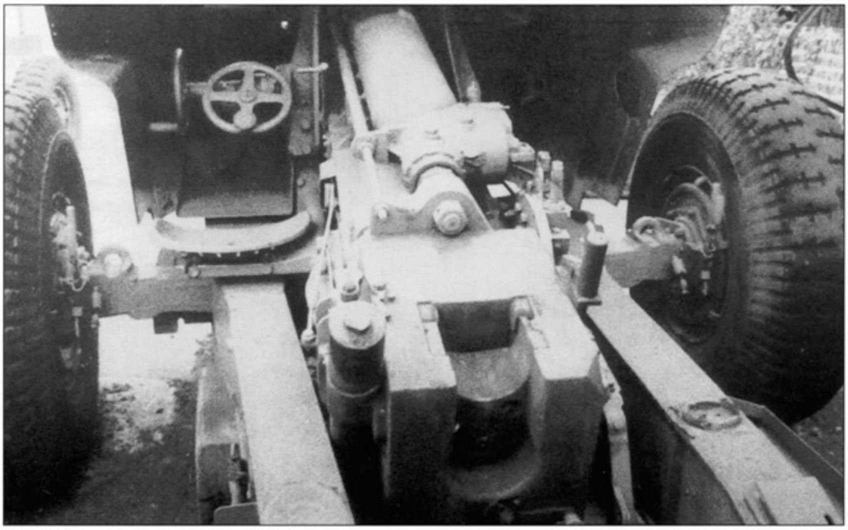
Two prototype carriers were ordered from Vickers-Armstrong and the first was prepared by March 1943. Firing trials were carried out in April 1943 and, as a result, modifications were made to the mounting and other equipment. The Archer was eventually issued in October 1944. The vehicle itself had a limited traverse of 11 degrees either side of the centre line but a very low silhouette and was therefore a good anti-tank design. Its biggest disadvantage was that the gun faced rearwards and the driver had to be moved before the gun could be fired. Some people saw the fact that the vehicle faced in the direction of escape as a good idea.

It was an all-welded construction and the armour thickness was in the region of 14–20mm of steel. In the mounting, the gun had an elevation of 15 degrees and a depression of 7.5 degrees. The mounting could carry 39 rounds. Although Archers were not supplied to the Army until 1944,

A side view of the 32-pdr anti-tank gun, probably on the ranges at Shoeburyness. (Royal Armouries Thurston Collection)



The breech block of the 32-pdr gun. The operating lever is on the right-hand side and the cylinder attached to the gun body by a bolt passing through the lug that appears just above the breech is used for pumping the gun into its travelling position. The cylinder to the left of the breech is the breech block buffer which brings the breech block gradually to rest in the open position. The buffer forces the block up after arresting it, thus releasing the heels of the extractors and allowing the next round to be loaded. (Courtesy of RAHT)

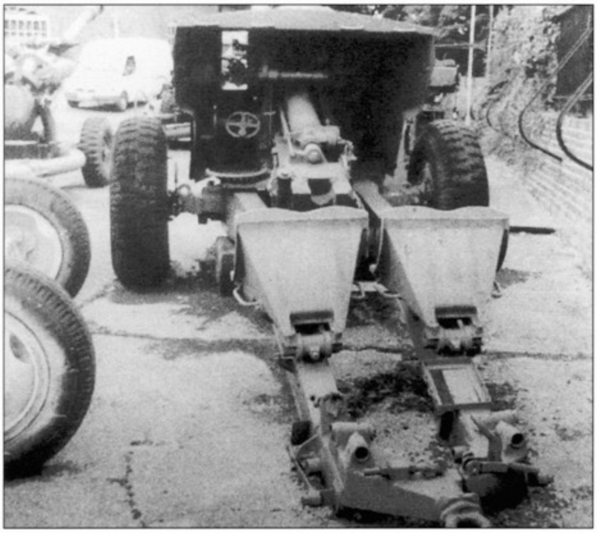


they remained in use in the British Army long after the war. Vickers were given an order for 800 vehicles but 665 were completed by the end of the war.

ARCHER, SELF-PROPELLED 17-PDR, VALENTINE MARK I SPECIFICATIONS

Weight	16 tons
Length	21ft 11in.
Width	9ft 0.5in.
Height	7ft 4.5in.
Speed	20mph
Range	140 miles
Armour	8–60mm
Armament	1 x 17-pdr, 1 Browning machine gun, 1 Bren gun
Engine	General Motors 6-cylinder diesel 192hp
Detachment	4

A rear view of the only 32-pdr anti-tank gun in existence at the Museum of the Royal Artillery in Woolwich. The trail spades are folded up and placed on the trail legs for transport. (Courtesy of RAHT)



The American M10 was a tank destroyer that had its main armament in a revolving turret in the centre of the vehicle, making it similar to the tanks it was meant to destroy. The British took the M10 and added the 17-pdr anti-tank gun, thus making it an extremely powerful tank killer. A counterweight was added to the rear of the turret to balance it and to counteract the extra weight that the length of the gun incurred, an additional weight was added at the muzzle of the gun.

Originally the M10 was known as the Wolverine in British service and the vehicles which had their turrets altered to take the 17-pdr were known as 17-pdr SP Achilles Mk ICs. The converted version of the later M10A1 was known as the Achilles Mk IIC. The conversions were carried out in late 1944 so the Achilles only saw action in the last year of the war. It was clear as soon as it entered service that it could be an extremely potent counter to German armour but was vulnerable to German high-velocity guns if hit. The commander therefore had to be tactically very adept at escaping once he had engaged the enemy.

The Archer in the last year of the war in 1945. (Royal Armouries Thurston Collection)

ACHILLES SPECIFICATIONS	
Weight	66,000lb tons
Length	19ft 7in.
Width	10ft
Height	8ft 1.5in.
Speed	30mph
Range	200 miles
Armour	12–37mm
Armament	1 x 17-pdr, 1 Browning machine gun, 1 Bren gun
Engine	Twin GMS6-71 diesels General Motors 6-cylinder diesel 192hp
Detachment	5

DRILL AND FIRING

Both the 6-pdr and the 2-pdr relied on a detachment of five men to man the gun. Each man was allocated a number and he was then expected to carry out the duties of that number according to the drill book.

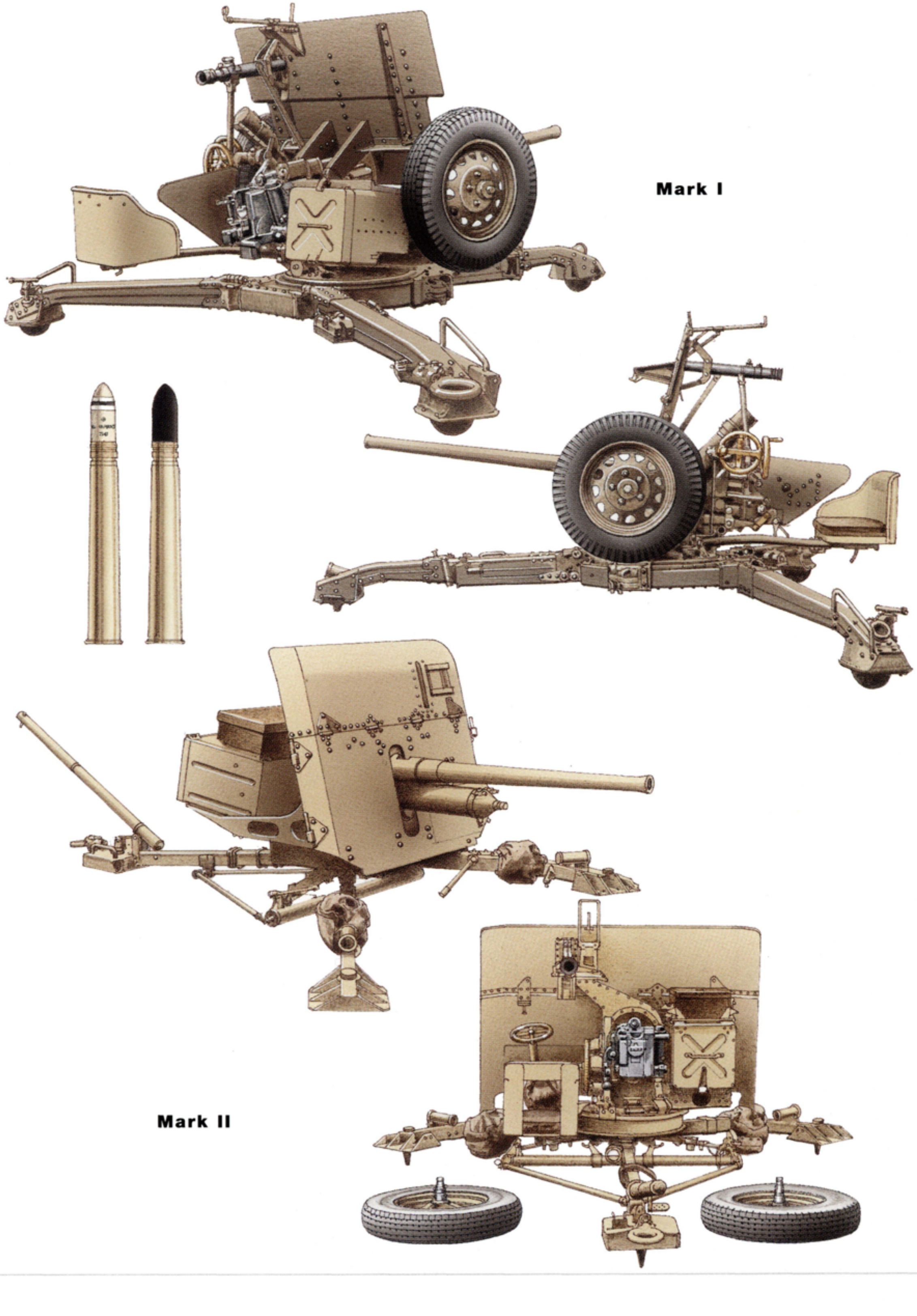
For the 2-pdr the detachment consisted of:

Number 1	The gun commander
Number 2	The loader
Number 3	The layer
Number 4	Ammunition number
Number 5	Ammunition number

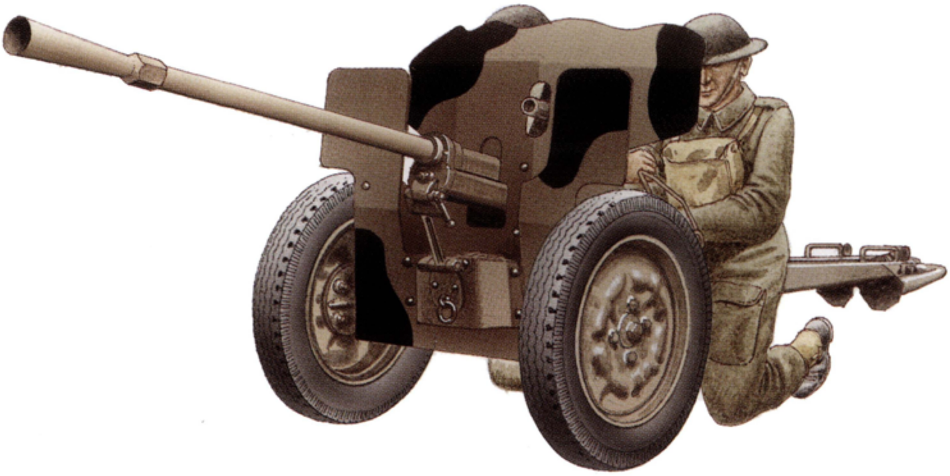
In action, Number 1 stood behind the layer's seat, 2 knelt on his left knee at the right-hand side of the breech, 3 sat on the layer's seat and Numbers 4 and 5 were ordered at the discretion of the Number 1. There were different evolutions for the different marks of carriages. As described, the Mark I carriage was quite different from the Mark II and IIIA carriages and therefore required a slightly different drill.

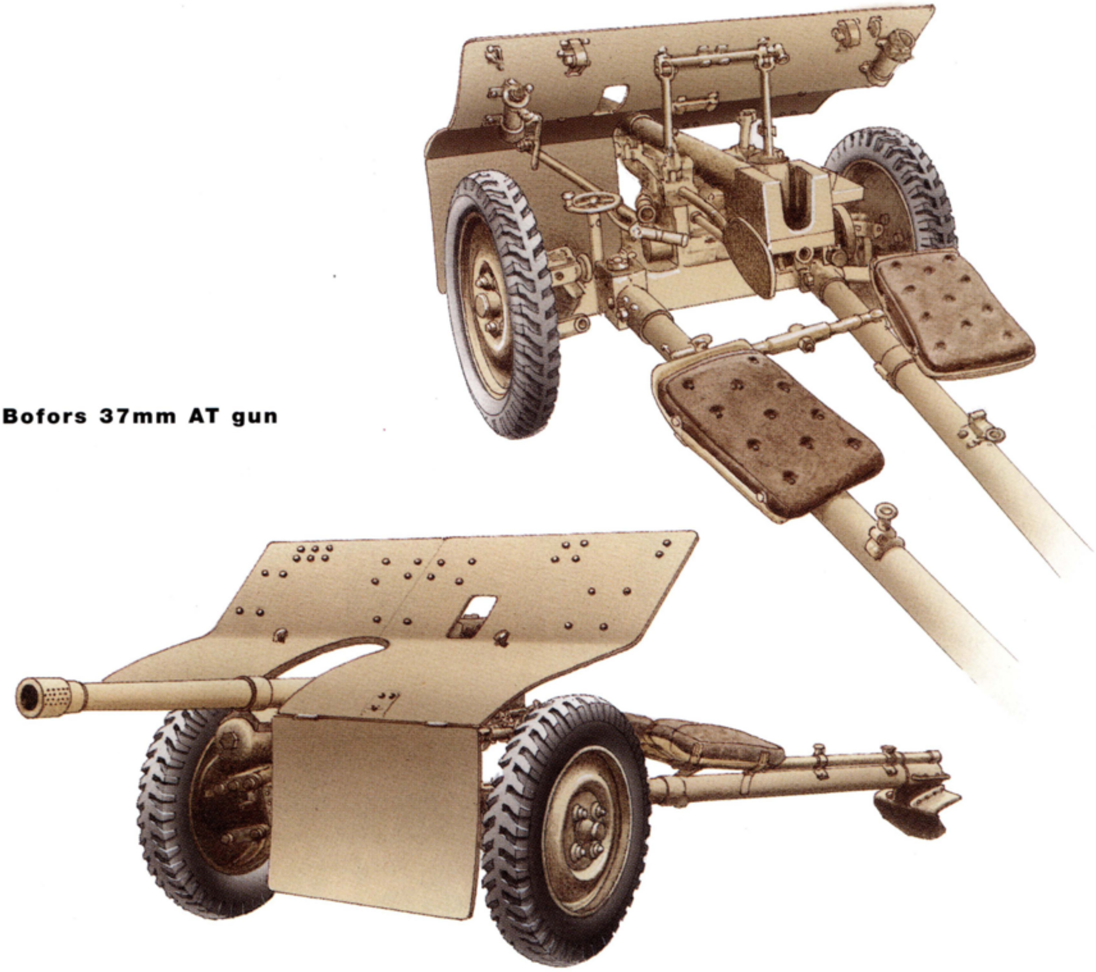
The 2-pdr was originally to be towed behind the tracked Dragon Mark IIC light vehicle but the drill manual gives specific instructions for three vehicles: the Dragon, the tow truck and the portee vehicle. In each case the positions are clearly given: on the Dragon, Numbers 1 and 5 sat beside the driver with Number 1 nearest him. Numbers 2, 3 and 4 sat in the rear with Number 2 nearest the gun. On the truck, Number 1 sat

A: 2-pdr AT gun Marks I and II mounting



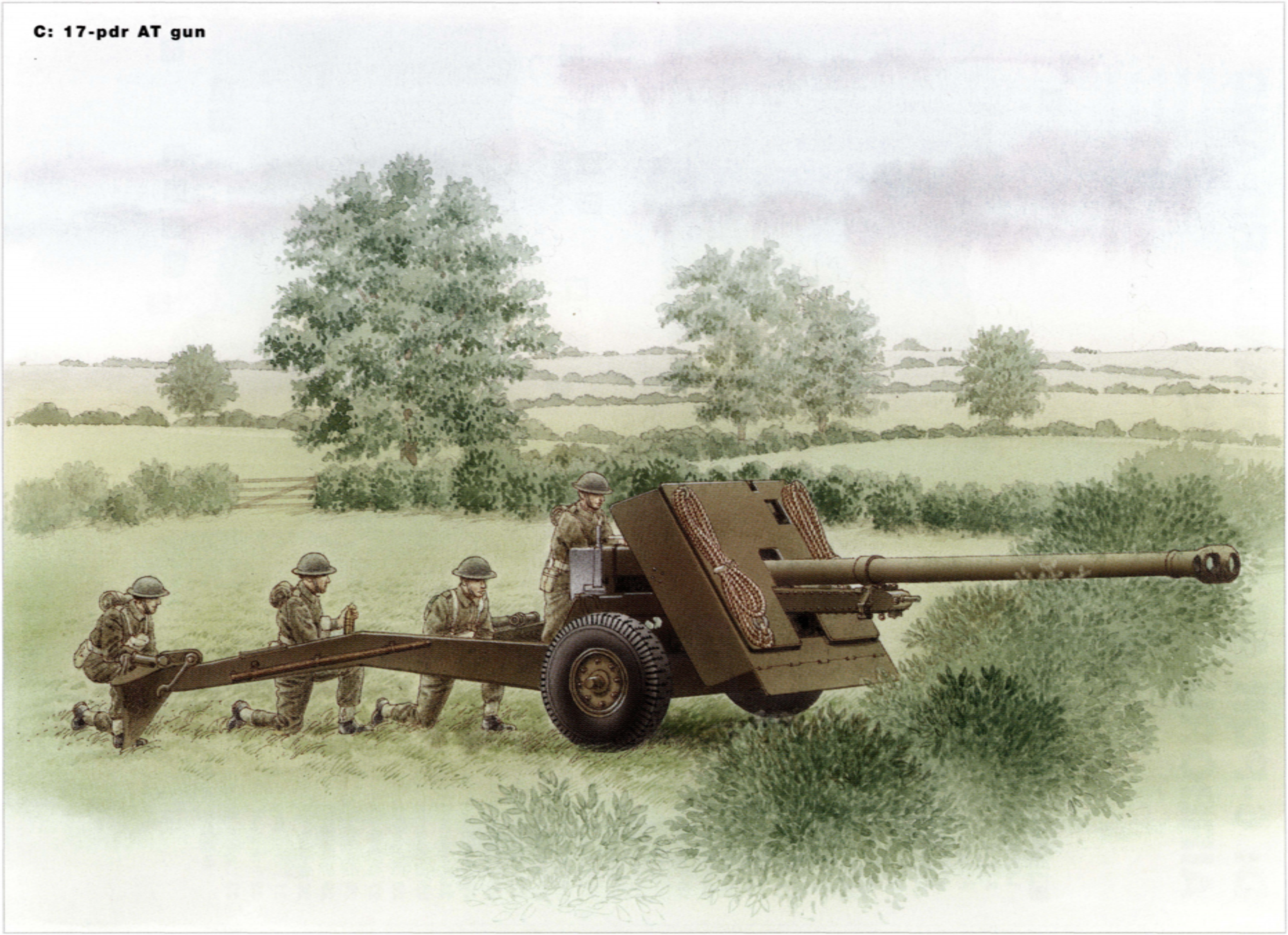
B1: Hotchkiss 25mm AT gun





B2: Bofors 37mm AT gun

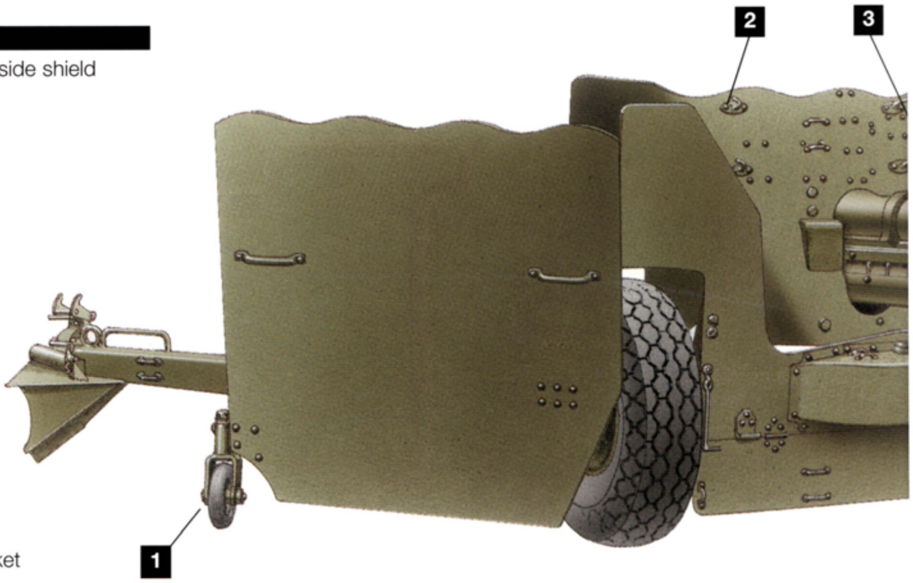
C: 17-pdr AT gun

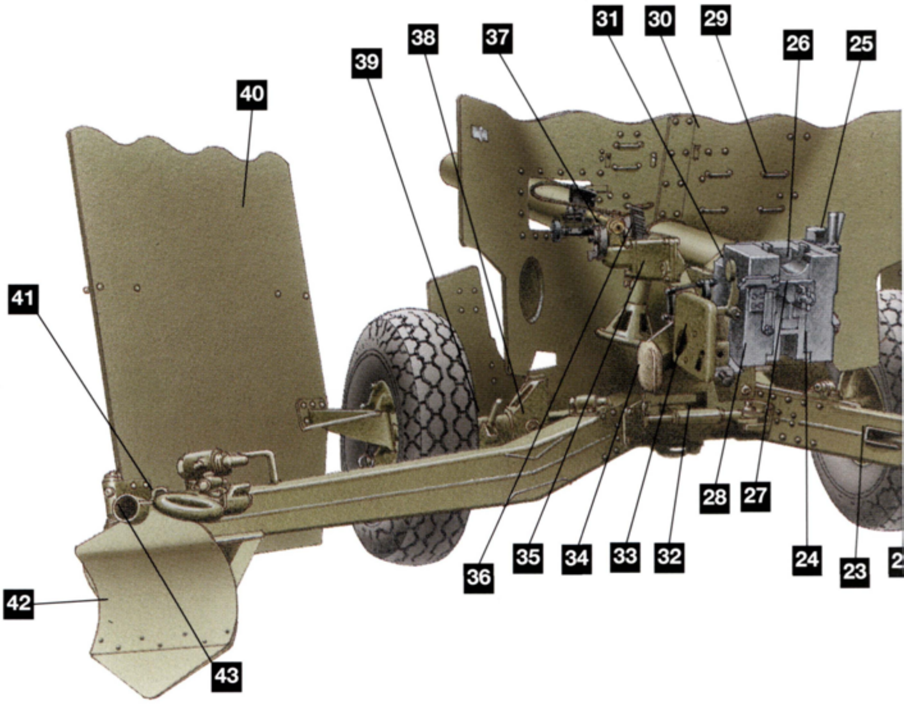


D: 6-PDR AT GUN, STANDARD AND AIRBORNE VERSIONS

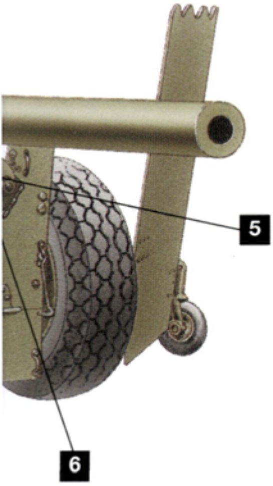
KEY

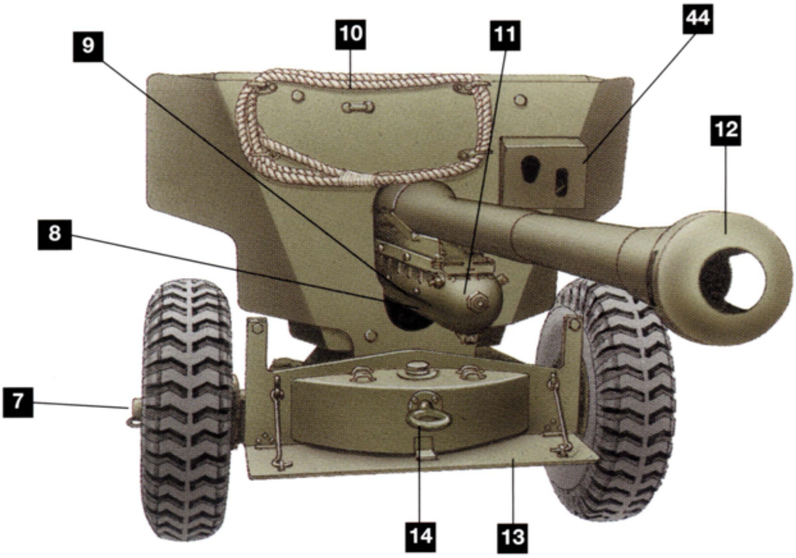
1 Wheel for altering angle of side shield
2 Drag rope brackets
3 Sighting box
4 Recuperator
5 Swing bolts
6 Inspection cover
7 Wheel eye for drag rope
8 Slipper guides
9 Lubricator
10 Drag ropes
11 End cap
12 Muzzle brake
13 Splinter shield
14 Breast drag eye
15 Trail leg of airborne gun showing jointed legs
16 No. 5 trail leg locking bracket
17 Bracket for drawbar
18 Lifting handles
19 Rear handspike bracket
20 Trail legs
21 Fore handspike bracket
22 Stiffener plates for trail legs
23 Stay housing bracket
24 Traversing handle
25 Breech handle
26 Breech block
27 Striker case
28 Breech ring
29 Staples
30 Shield
31 Firing lever
32 Trail lock
33 Layer's traversing rest and firing lever support



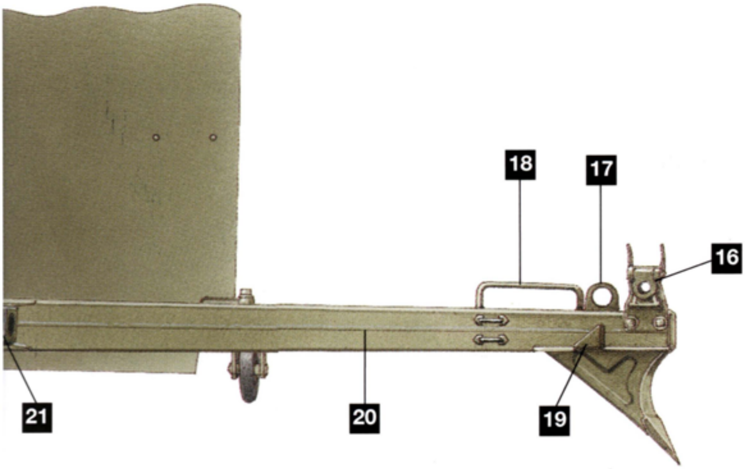


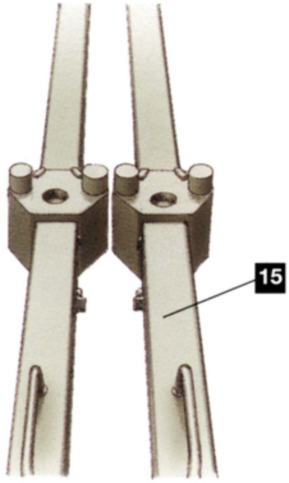
34 Padded traversing rest
35 Layer's elevating gear
36 Elevating arc
37 Telescopic sight
38 Axletree
39 Left wheel brake lever
40 Side shields
41 Trail eye
42 Trail spade
43 Handspike tubes
44 Cradle clamp



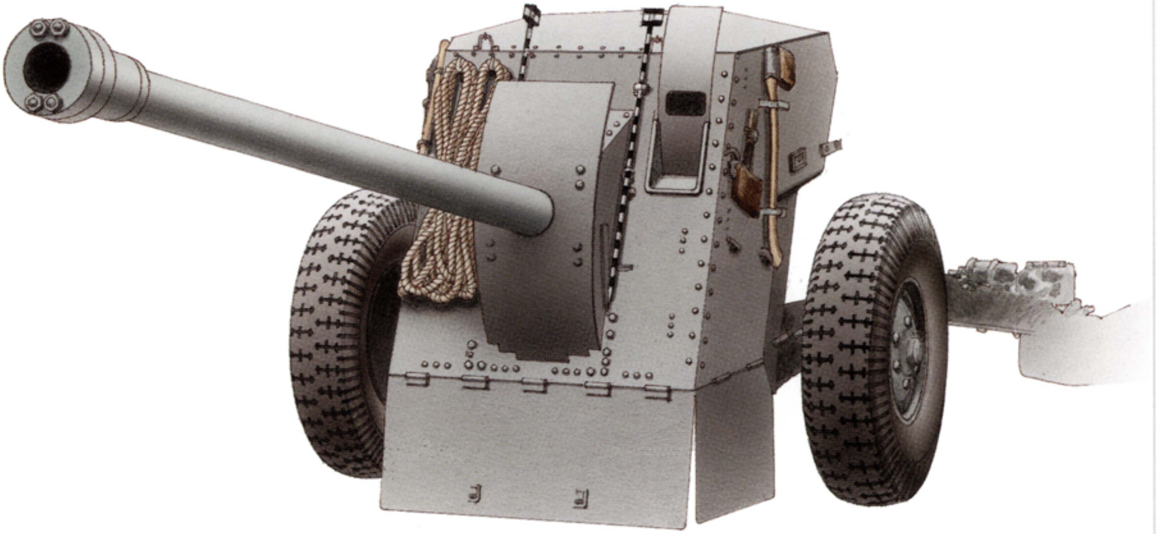


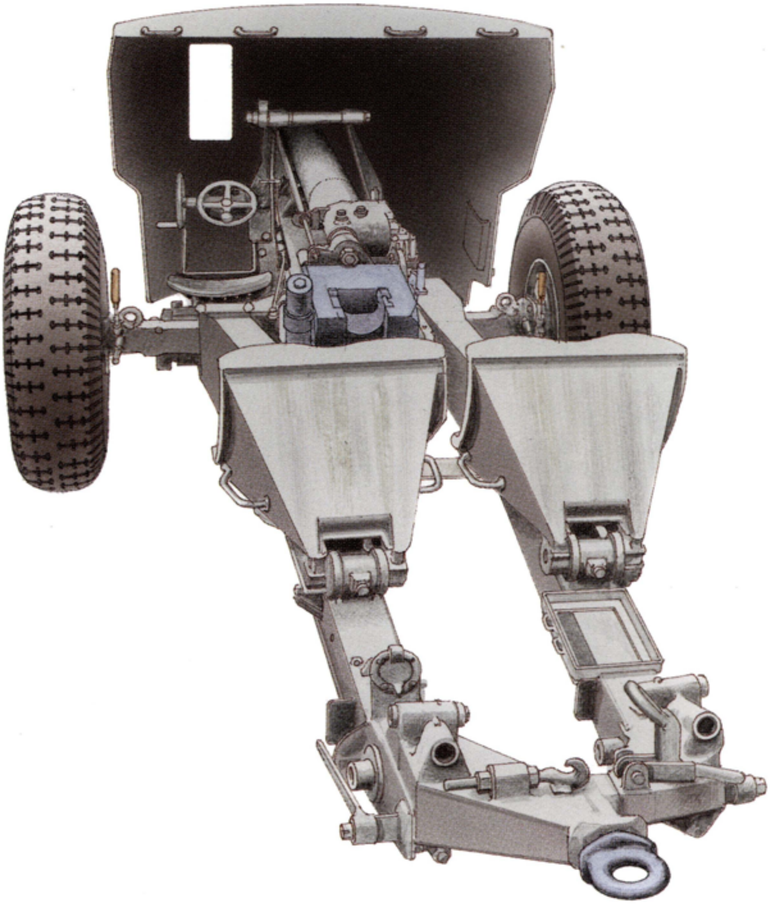
Airborne



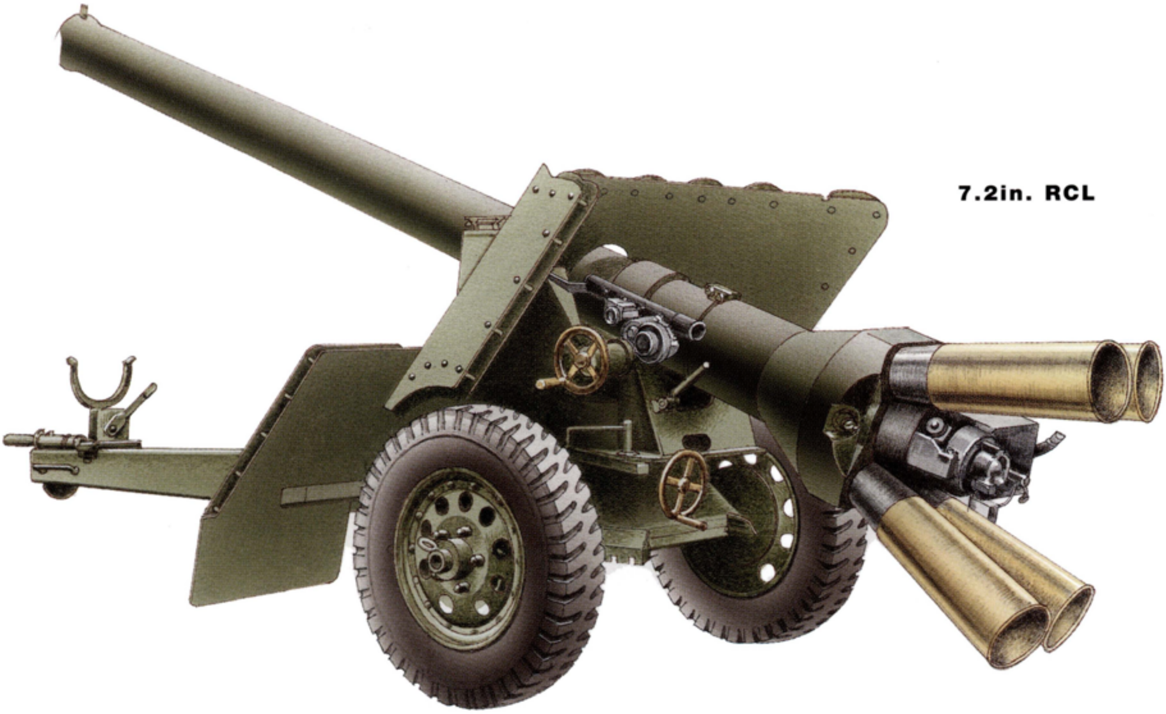


E: 32-pdr AT gun

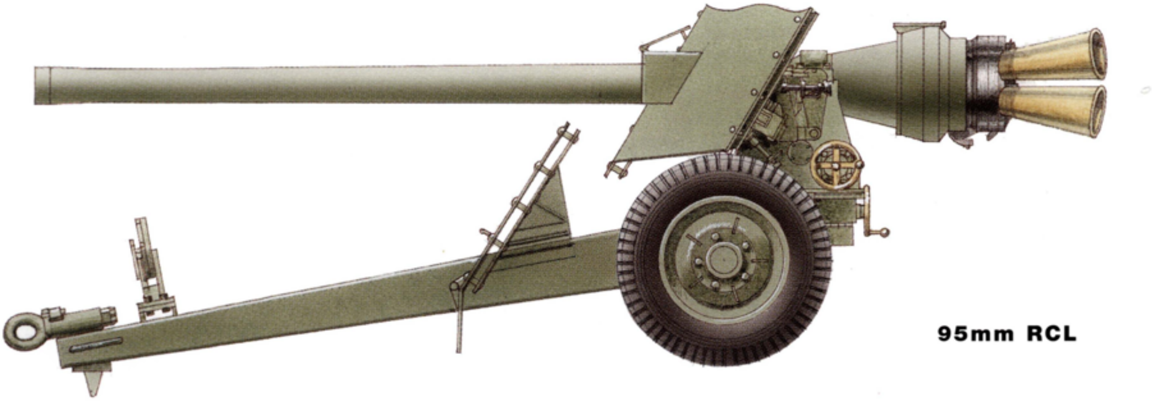




F: Recoilless weapons 7.2in. RCL and 95mm RCL



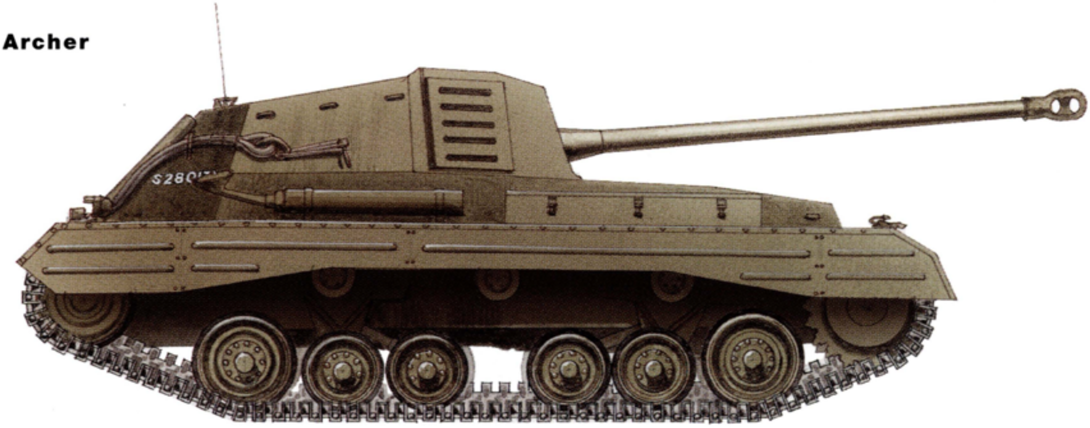
7.2in. RCL



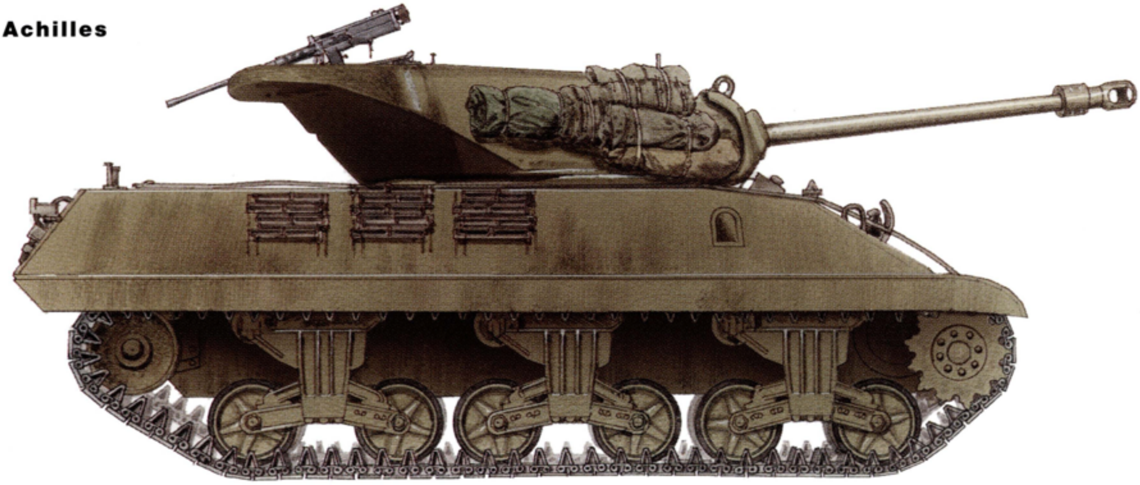
95mm RCL

G: Self-propelled guns and portees

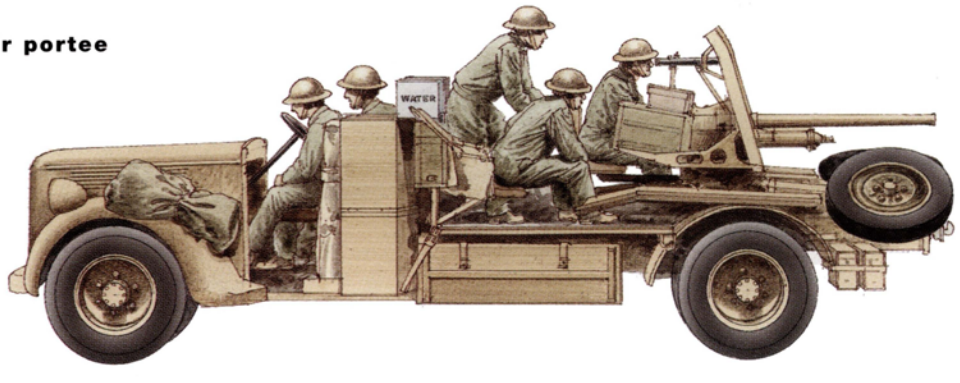
Archer



Achilles



2-pdr portee

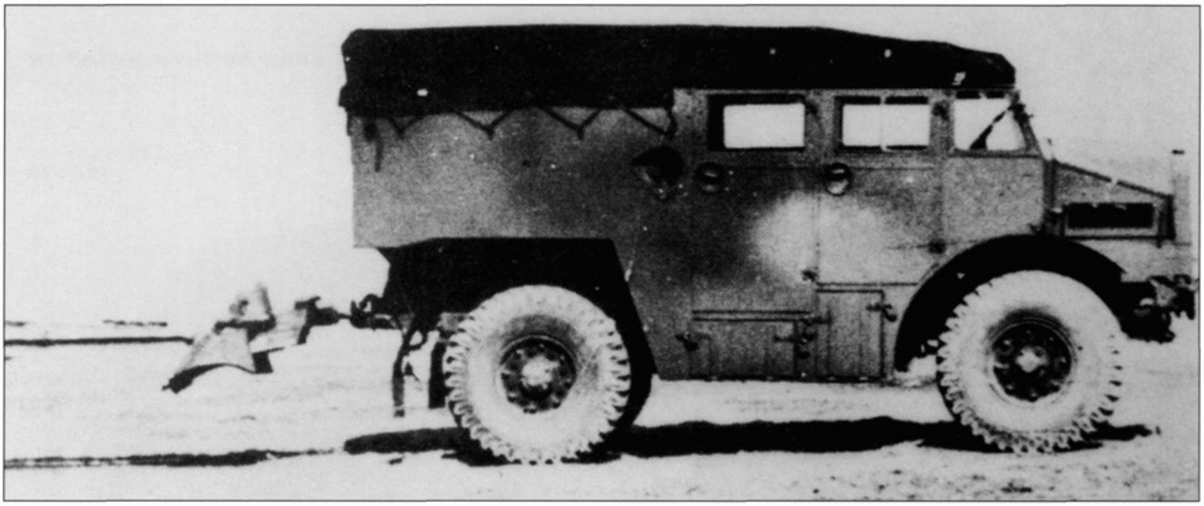


The Archer self-propelled gun at Annual Camp, Belford, Northumberland in 1948. This gun belonged to the 631st Anti-Tank Regiment Royal Artillery. (Courtesy of RAHT)

beside the driver, 2 and 4 on the nearside and 3 and 5 on the offside. Numbers 2 and 3 were nearer the gun. On the portee vehicle (this could be one of a number of vehicles), 1 and 5 sat beside the driver (5 nearer the driver), 3 on the gun seat, 2 on the near side and 4 on the offside rear seats.

As mentioned, the 2-pdr carriages varied between Marks I and II and therefore the drills for the two guns differed slightly. In the case of the Mark I gun the drill to prepare for action was as follows: Number 1 removed the leg cover, examined the leg and replaced the cover. He saw that the bore was clear and that the gun, buffer and recuperator were properly connected up. He satisfied himself that the detachment and equipment were in all respects ready for action. Number 2 saw that the handspike was securely attached to the trail leg, removed the muzzle cover and examined the breech and ensured that the emergency ammunition box was full. Number 3 removed the sight and breech cover, examined the sights and, after 1 had seen that the bore was clear, tested the firing mechanism. He replaced the cover unless otherwise ordered when 1 saw that the bore was clear. Numbers 4 and 5 examined all ammunition and the equipment in the truck.

To bring the gun into action, Number 1 first unhooked the trail. He then went to the folding leg and pressed down on it while pulling down on the shield. Number 3 removed the trail leg joint pin and then 2 and 3 swung the legs down into the open position and locked them. All the legs were dropped and the covers removed from the breech and sight. Number 2 then took the handspike and, with Number 3, lifted the gun off the wheels and locked it in the firing position. The main difference between the carriages was that the Mark II and IIIA carriages had the wheels taken off and removed to the rear. This meant it took slightly longer to reassemble the carriage in an emergency. Laying the guns was also slightly different: on the Mark I carriage, Number 3 depressed the pedal and Number 1 swung the gun round. This was clearly stated as a



The Morris C8 tractor Mark 3 with Mark 5 body. (Royal Armouries Thurston Collection)

two-man action. In the later marks of carriage, Number 3 put the traversing gear into high gear by depressing a pedal and then traversed the gun without the aid of the Number 1. Firing consisted of squeezing a trigger on the elevating hand wheel in the case of the Mark I and depressing a pedal on the Mark II and IIIA guns.

For the 6-pdr the 1944 drill handbook stipulated that the detachment was as follows:

Number 1	The gun commander
Number 2	The loader
Number 3	The layer
Number 4	Second-in-command and link number
Number 5	LMG gunner and lookout

There were several evolutions, which were necessary not only to fight the gun but also to get it into action. For example, 'detachment rear' was a formation for forming up behind the gun about one pace to the rear of the trail eye. There were drills for preparing for action, which involved removing gun covers and preparing the piece. Moving the gun required special positions: Number 1 in front of the muzzle, 2 and 3 at the trail eye and 4 and 5 in front of the shield. The drag ropes kept on hooks on the shield were then attached to the drag washers on the wheels. Number 2 inserted a handspike in the trail, which could then be lifted and the whole gun moved. When the gun was to go into action it could be for action rear, action front, action left or action right. The procedure basically involved the crew dismounting, unhooking the gun and placing it in the required position. The towing vehicle then retired to the wagon line and the gun was further manoeuvred.

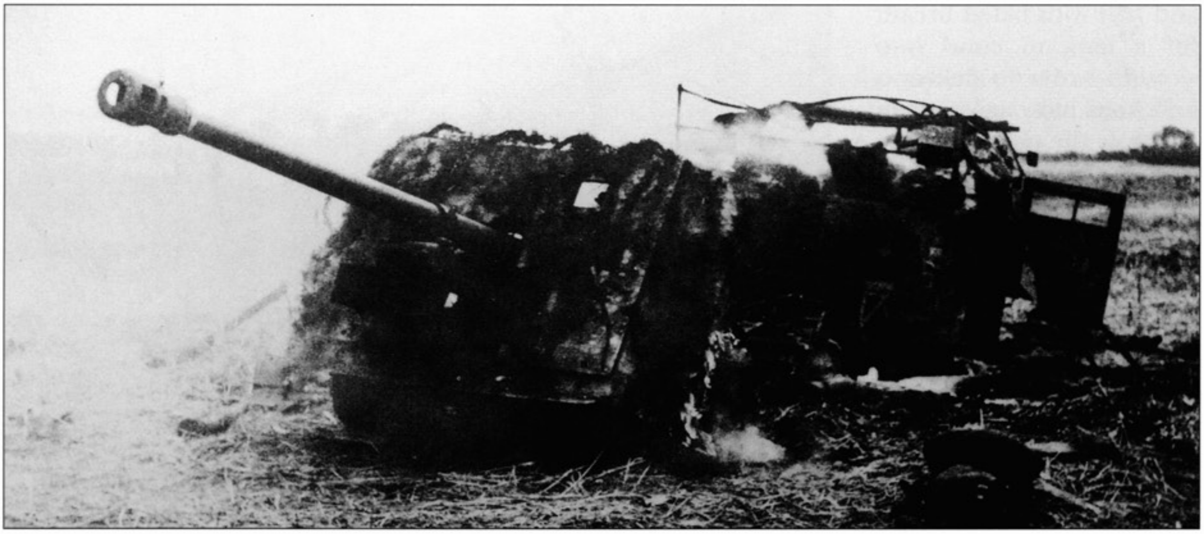
When the gunners were mounted, Number 1 sat beside the driver, Numbers 2 and 4 were on the left-hand side and Numbers 3 and 5 on the right-hand side. Positions in action were: Number 1 took cover or lay down a short distance from the gun on the upward flank; 2 knelt to the right side of the breech on his left knee; 3 knelt on the right knee on the left side of the breech; 4 crouched behind the layer and 5 was available as ordered by the gun commander.

The gun could then be laid (aimed) and the commander usually gave the order to the target based on the clock system. In other words, the gun was considered to be the centre of a theoretical clock with the immediate forward position as 12 o'clock, 3 o'clock was to the gun's immediate right and 9 o'clock to the immediate left. Number 4 repeated the order and trained the piece by pushing it into the required position using the shoulder piece. He then called that the gun was 'On'. Number 2 loaded the gun and reported 'In' when the round was loaded. The commander then had to decide when and where to engage. This normally included estimating the lead or distance in advance of the target that the gun should be fired. The range was set on the range scale by Number 4. The commander then ordered the gun to fire; the order was repeated by the Number 4 and Number 3 fired. If the target moved out of the traversing range of the gun then the gun had to be centred and the trails lifted to move the arc of fire. The importance of deciding whether to use the open sight or the telescope could be crucial and orders were given to change from one to the other depending on the commander's view.

Loading was ordered by the Number 4 but Number 2 loaded, pushing the cartridge home with a semi-clenched fist. It should be remembered that the 6-pdr had a semi-automatic breech and so the breech automatically shut as soon as the cartridge was home. Timing was crucial, as many a gunner will attest, and damaged fingers could all too easily result.

17-pdr drill

The 17-pdr required a seven-man detachment to fight the gun. Judging by the size and shape of the piece, this is hardly surprising. The drill for the gun was very similar to those for the other guns but moving the 17-pdr was another matter. The emphasis on moving the gun in the drill is based upon the fact that the gun had to be on firm level ground. That was all very well, but the type of terrain to be encountered was impossible to predict. The drill can therefore only really be seen as speculative:



The result of a direct hit by a mortar: a destroyed 17-pdr gun and Morris tractor in Germany (RWM)

Number 1 The gun commander
Number 2 The loader
Number 3 The layer
Number 4 Second-in-command and link number
Number 5 LMG gunner and lookout
Numbers 6 and 7 Additional ammunition

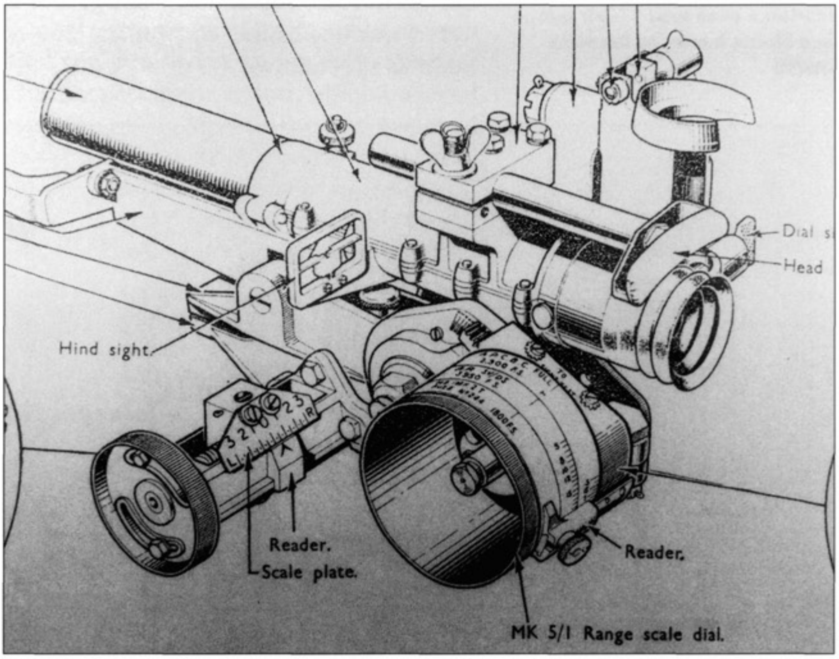
The positions were: Numbers 2 and 3 at the rear of the shield, 4 and 5 at the trail eye, 6 and 7 at the wheels. Numbers 4 and 5 had to lift the trail to move the gun and they used trail spikes in the handspike sockets to do this. It must have been extremely hard going, even on hard ground, and a gun of over 4,000lb weight would have been almost impossible to move on soft or boggy ground.

Sighting

Most anti-tank guns relied on a direct-fire sighting system to aim the gun, although some, such as the 17-pdr, were equipped with an indirect-fire system as well as the primary sighting telescope. The primary sight had to be able to have some form of lead so that the movement of fast-moving targets could be predicted and such targets engaged. Moreover, even at short ranges, given the muzzle velocities used during the Second World War, the gun did not have a flat trajectory and therefore some kind of tangent elevation had to be applied to the gun barrel. Provision for lead and elevation could be designed into the sight, which would typically show cross hairs with horizontal divisions for the lead and vertical divisions for the range. In some telescopes the lead was actually added to the sight bracket so that the scope itself aimed off and allowed the operator to aim directly at the target.

TACTICS

It must have taken a great deal of nerve to crouch behind a small metal shield and wait with bated breath for a tank to crawl into view. In order to deliver a knockout blow at less than 1,000yds the gun and crew had to be perfectly concealed and blend into the terrain. The author of this book was once told by a former anti-tank gunner that an anti-tank gun is like a large sniper's rifle. The guns are high-velocity, flat-trajectory weapons intended to destroy a tank or crew with one hit. The use of such guns was widely



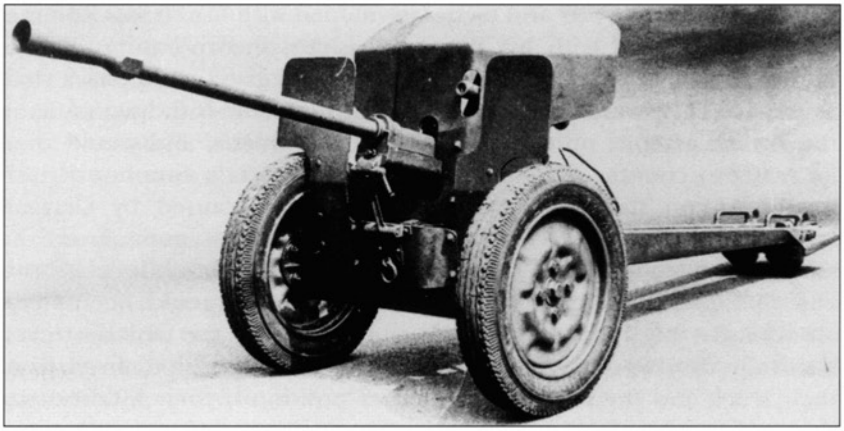
The direct-fire sight for the 17-pdr AT gun. Although the gun was reliant on visual sighting, it could be used for indirect fire and therefore it was equipped with a dial sight carrier, which can be seen on the upper right of the picture. (Explosion, Museum of Naval Firepower)

debated during the war and tactics developed with use. It was Rommel who demonstrated with his Panzer divisions, incorporating all-arms groups as part of a tactical whole, that anti-tank guns could play a vital, aggressive, role in attack. In battle the Panzers would withdraw, enticing the British armour onto the anti-tank gun screens, and would then be ready to counter-attack from the flanks. It was a common British misconception that most tank casualties were caused by German tanks, whereas they were in fact caused by anti-tank guns. From the early desert campaigns, guns were mounted on mobile platforms and this gave rise first to the idea that the gun could be used in an offensive way and, eventually, to the concept of the tank destroyer. Tactically they were usually placed in a hidden position, fired from their truck and then moved to another position if their location was detected: a sort of 'shoot and scoot' technique. Some people were more adept than others at handling their guns and Sergeant Gould of the 106th RHA at the battle of Beda Fomm, previously mentioned, destroyed six tanks with one Bofors gun. The reason for this appears to have been that he allowed them to pass him by until they exposed their rears and then opened fire without being discovered. It was soon learned that anti-tank guns placed in defilade or firing obliquely from a hidden position were as deadly to tanks as the machine gun was to infantry.

Units of tank destroyers were probably best known for their actions during the north-west Europe campaigns of 1944 and 1945 but they were only part of the story. Towed weapons played a very significant part in stiffening the armament of infantry battalions and the 'in the field' approach adopted by the gunners attached to these units was far different from that of the 'sit and wait' school of thought. The necessity of warfare in urban and built-up environments, together with the complex types of terrain encountered in Europe, led to the anti-tank gun being used in a defensive and offensive role. Guns were used to defend strong points and to cover roads and buildings that were tactically important but, more than that, they were also used in complex coordinated shoots that were part of everyday gun/infantry actions. In his book *With the Jocks,* Peter White describes the offensive use of the anti-tank gun, in this case the 6-pdr:

> When we joined the anti-tank guns in shoots at the front, the aim was usually to knock the spires off churches and the lids off windmills and drill holes in any other tall landmarks the other side of the river. These were invariably used by the enemy as observation posts to spot for his mortaring.

It can be seen from this statement that the guns were used in any way that was deemed suitable or necessary at the time. In the Far East and in Burma it was found that anti-tank guns were favoured when trying to destroy Japanese defensive bunkers. It was not unusual to plaster a defensive position with indirect high-explosive shellfire and then wait for the cover of night. During the night a 6-pdr could be disassembled and emplaced very close to the target where it would be used to fire directly at the bunker. It was a slow and very laborious process with high risk, but it did work.



The 25mm Hotchkiss mle 1934. In French service it was often horse or mule drawn. (Courtesy RAHT)

Wherever possible in a defensive position a gun would be dug in. This meant a laborious task for the gunners to create a gun pit (a hole large enough to take the gun) and then sandbag it and camouflage it. The preparations could be quite elaborate, as White points out:

> Jimmy Wannop used to occasionally come and see us while visiting one of his 6-pdr anti-tank guns dug deep into a corner of our wood. This gun made us feel a little happier about the possible appearance of enemy tanks over the snow to our front. The Jocks of the gun crew had built themselves a wonderful home at the rear of their gun pit, and to visit them was well worth it, if only to sit and get warm for a while in its straw lined depths.

Prepared positions were, of course, something of a luxury when a fast-moving battle was being fought and there is much photographic evidence to suggest that guns were often placed on street corners with no protection at all.

In the desert, anti-tank guns were a very valuable asset. If the weather was good, and therefore visibility with it, a gun could be used at long range with great effect, especially if the telescopic sights were good enough. As a good example of what could be done with the 6-pdr, we can take the Snipe action on 27 October 1942 at the battle of El Alamein. This action involved 16 6-pdrs of the 2nd Rifle Brigade and six of G and H troops of the 239th Anti-Tank Battery, Royal Artillery. The Rifle Brigade battalion was unusual in having so many anti-tank guns but together these anti-tank units were able to demonstrate the use of such weapons when facing massed tank attacks. This group broke up repeated attacks by groups of 20 German and Italian tanks at ranges of anything between 100 and 1,200yds. One particular gunner, Sergeant R. W. Blinks of 239 Battery, is said to have knocked out a Panzer IV at a range of one mile. It is said that the guns accounted for 21 German and 11 Italian tanks, plus five self-propelled guns, and an additional 15 to 20 were damaged but recovered by the Germans. Between 52 and 57 (and possibly more) were destroyed by the combined use of 19 guns. The Rifle Brigade and the gunners suffered 72 casualties. It was an amazing demonstration of what the anti-tank gun could do and it earned the commanding officer, Lieutenant Colonel Victor Turner, a Victoria Cross.

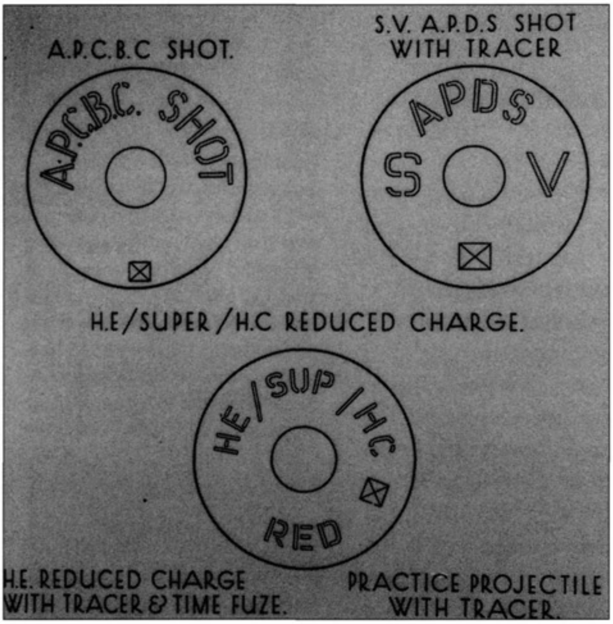
One of the key things about the defence of outpost Snipe was that the 6-pdr was found to be a very powerful gun that could destroy anything that the Germans could throw at it during this period of the war. The stopping power of the gun was attested to by one of the greatest exponents of the tactical use of anti-tank guns, Erwin Rommel, who stated: 'a murderous British fire struck into our ranks and our attack was soon brought to a halt by an immensely powerful anti-tank defence, mainly from dug in anti-tank guns'.

A combination of surprise, good use of the ground and determination had led to one of the most remarkable actions involving anti-tank guns in the Western Desert. There were other factors: many of the guns had been sited so that they caught German and Italian tanks from the side where they were more vulnerable. The drawback was that the 6-pdr could not be moved easily in sandy conditions once it had been sited. Moving it, if the target moved out of its arc of fire, or if it had to be re-emplaced, was a very difficult, time-consuming task.

ORGANISATION

The 2-pdr anti-tank gun became part of the Royal Artillery in 1938 when five field brigades were converted to anti-tank regiments and each one was attached to a division's artillery complement. They were the 13th, 14th, 21st, 26th and 29th. At the beginning of the war anti-tank regiments tended to be organised into three batteries, each of four troops of four guns, which totals 48 guns in all. In 1941 the 7th Armoured Division deployed a divisional support group of the 3rd Royal Horse Artillery with 2-pdrs, together with a divisional artillery regiment. In comparison, by 1942 the 7th Armoured Division at the battle of El Alamein deployed two batteries of 6-pdrs with the 131st Infantry Brigade and additionally had the 65th Anti-Tank Regiment as part of its divisional complement: all of the guns were 6-pdrs.

A image of the base stencilling of 17-pdr cartridge cases taken from the handbook of 1945. (Explosion, the Museum of Naval Firepower)


A.P.C.B.C SHOT.
S.V. A.P.D.S SHOT WITH TRACER
A.P.C.B.C. SHOT
APDS
S
V
H.E/SUPER/H.C REDUCED CHARGE.
HE/SUP/H.C.
RED
H.E. REDUCED CHARGE WITH TRACER & TIME FUZE.
PRACTICE PROJECTILE WITH TRACER.

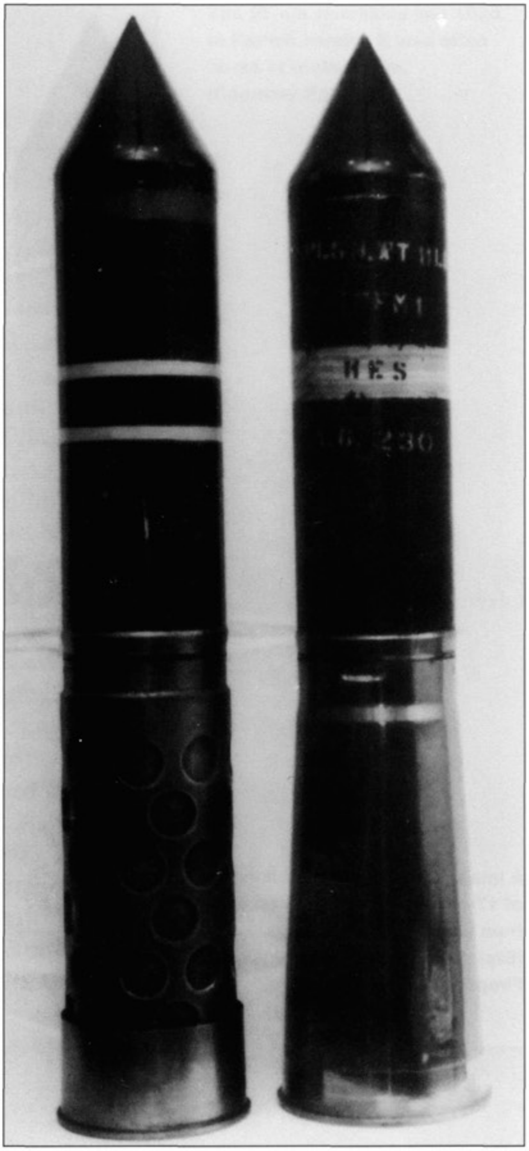
Anti-tank guns were routinely attached to infantry and armoured divisions. In 1944 an infantry division had 78 6-pdr guns and 32 17-pdr guns. Normally an infantry division had a separate artillery regiment. For example, the 5th (Yorkshire) Division had the 52nd Anti-Tank Regiment and the 43rd Division had the 59th Anti-Tank Regiment. In a regiment there were four batteries of three troops each. Where the guns were mixed they consisted of four 6-pdrs in one troop and two troops of four 17-pdrs. The 6-pdr was often towed by a Bren carrier, whereas the heavier 17-pdr relied on the Morris C8 or Guy Quad Ant tractor.

Armoured divisions, on the other hand, had 30 6-pdrs, 24 towed 17-pdrs and 24 self-propelled Achilles guns. The guns were again organised in four batteries, two of 12 17-pdrs each and two of Achilles (or, in early 1944, the M10).

AMMUNITION

At the beginning of the Second World War, virtually all anti-tank ammunition was based on the solid shot projectile. This was a hardened steel projectile that was intended to punch a hole through the defensive armour of a tank by kinetic energy alone. The ammunition system was always that used in a quick-fire mechanism: it consisted of a projectile with a cartridge case fixed to it and was therefore known as a fixed round. The propellant was contained in the brass cartridge case and was initiated by the mechanical impact of the firing pin on the primer at the base of the case. There were also capped versions of the solid shot projectiles such as the APC (Armour Piercing Capped) and APCBC (Armour Piercing Capped Ballistic Capped). In the former the head of the projectile was protected by a cap which absorbed the initial impact and the latter had an extra cap to improve its flight performance. This was necessary since it was found that solid shot had begun to shatter on certain types of armour. The cap absorbed the initial impact while the main projectile entered the armour.

Once the limitations of the gun itself were recognised, a lot of effort went into the production of new forms of ammunition and most of the successful designs were to utilise either chemical energy or much greater penetration, attained by the use of a sub-calibre round at a high velocity. APCR (Armour Piercing Composite Rigid) was an improved solid shot consisting of a projectile of a smaller calibre than the bore of the gun and made of denser metal such as tungsten. It was dressed with an outer jacket of light alloy that was disposed of as the projectile hit the target. A further groundbreaking development came about through the Armaments Research Establishment and was essentially designed by two engineers named Permutter and Coppock. This was the APDS (Armour Piercing Discarding Sabot) round. The tungsten round was again used but this time it was surrounded by a light alloy sheath, or sabot, that split into four sections when leaving the muzzle of the gun. The projectile was thus able to reach a much higher velocity because of the greater forces exerted on the larger surface area of the projectile base in the gun but without the weight of the whole projectile in flight. Rounds using this principle were then supplied for existing equipment. In a 17-pdr this increased the muzzle velocity from 2,875ft/sec to 3,950ft/sec. Chemical energy can best be dealt with by describing the principle of the hollow charge projectile. This consists of an explosive charge with a cone hollowed out of it and the space lined with copper. When the charge is detonated from the other end the liner is turned into a super high temperature vapour jet that penetrates



Ammunition for the Burney guns: on the left is a round with parallel perforated cartridge and the round on the left has a tapered cartridge case. This was the original design for the 3.45in. RCL gun that was going to be hand-held. The base had a blowout element to allow the propellant gas to escape. (Royal Armouries Thurston Collection)

armour. British designers developed this principle but it was never really adapted for use in the anti-tank arena during the war by British forces although other nations used it.

AMMUNITION FOR THE 2-PDR GUN

AP shot Mark 10T	The solid steel projectile
APCBC Mark 9 BT	A capped solid steel projectile
AP shell Mark I	A base fused projectile
HE shell Mark II	Base fused HE shell

Propellant cases: length 40mm x 305mm, rim 56.8mm, straight brass

AMMUNITION FOR THE 6-PDR GUN

AP shot Mark 1T to 7T	The solid steel projectile with tracer
APC shot Mark 8T	A capped solid steel projectile
APCBC shot Mark 9T	As above with both a ballistic and a penetrative cap
APCR Mark 1T	Tungsten-cored ammunition with a light alloy body
APDS Mark 1T	Tungsten-cored body with a discarding sabot
HE shell Mark 10T	High-explosive shell with the No. 243 fuse and a tracer

Propellant cases: length 57mm x 442mm, rim 89.5mm, T-necked brass

AMMUNITION FOR THE 17-PDR

AP shot Mark 3T	The solid steel projectile with tracer
APC shot Mark 4T	A capped solid steel projectile
APDS Mark 1T	Tungsten-cored body with a discarding sabot
HE shell Mark 1T	High-explosive shell with the No. 244 fuse and a tracer

RECOILLESS WEAPONS

Since the anti-tank gun was effectively an infantry weapon, it would not be out of place to describe the efforts of Sir Dennis Burney who, at the end of the war, developed a series of weapons on the recoilless principle. This principle was widely adopted in Britain after the Second World War and became the basis for the design of the BAT series of anti-tank weapons introduced into service before the advent of the anti-tank missile. Burney's guns were developed to counteract the concrete bunkers found in the Far East and in northern Europe but they utilised an unusual form of ammunition that was to be the basis for the High Explosive Squash Head (HESH) rounds used against tanks even today.

Burney developed his ideas of recoilless weapons independently of any knowledge gained from German weapons. His ideas depended on the principle that if a projectile was fired from a gun the recoil could be countered by gas exhausted at very high velocity from the other end of the weapon. He invented a weapon that had a gas venturis at the rear and used perforated cartridge cases. When the gun was fired, the propellant gas first ejected the projectile and then was forced out through the venturis. He designed five different weapons on this principle and each one featured an interrupted screw breech surrounded by the venturis. The carriages on the larger guns had their trail facing in the direction of the muzzle of the gun to counter the gas exhaust and this made for a very light and manageable carriage. Of the five guns, only the 3.45in. was a shoulder- or tripod-fired weapon. The 3.7in., 95mm, 7.2in. and 8in. guns were all mounted on carriages. The pilot models were all manufactured by the Broadway Trust Company, to which he was connected, but they were taken seriously by the Ordnance Select Committee. The ammunition was also a departure from conventional weapons in that the cartridge was pierced to allow the gases to escape and the projectile consisted of a plastic explosive filling and a base fuse. The idea was that the projectile collapsed against the outer wall of the target and then the fuse exploded the plastic explosive. This caused the inner wall of the target to collapse and damaging scabs to fly off in all directions.

The 95mm recoilless gun was adopted by the War Office and 12 equipments were ordered. This was in 1945 and so no units were adopted for campaigns. Likewise the 7.2in. weapon was developed by the Ordnance Board rather than by a commercial concern. The 7.2in. gun was a bag-charged gun with an interrupted screw breech. As far as the author is aware this model is the only one remaining in existence and it is possible to see it at Firepower, the Museum of the Royal Artillery in Woolwich.

One of the Burney recoilless weapons being tested at the end of the war. This is probably the 7.2in. gun. The main difficulty with these weapons was their excessive back-blast and therefore detachments needed to be very careful at the rear of the gun. (Courtesy Trustees of the Royal Armouries)

RECOILLESS AMMUNITION

95mm recoilless gun	Propellant cases: length 76.2mm x 583, rim 134.6mm, T-necked brass
3.7in. Mark 1 recoilless gun	Propellant case: 95mm straight steel with 104 1-in. holes
3.45-in Mark 1 recoilless gun	Propellant case: 88mm straight steel perforated

(The 7.2in. recoilless gun was of BL type and thus had a bag charge)

GLOSSARY

Autofrettage The system where a gun is subjected to hydraulic pressure that stretches the inner surface of the gun beyond its elastic limit, thus strengthening the gun.

Axletree A transverse beam supporting a gun carriage on the ends of which the wheels revolve.

Breech The rear portion of the gun which accepts ammunition.

Breech ring The end fitting of the breech into which the breech block fits.

Buffer Part of the gun recoil control system that controls backward movement of the gun. This can be done by a spring or using a hydraulic action.

Cradle The part of the gun in which the gun recoils and which has the trunnions attached to it. The cradle is normally connected to the recuperator and thus isolates the recoil of the gun in the upper carriage while recoil is controlled by the buffer.

Elevating arc The toothed gear arc used to elevate the gun and operated by the elevating hand wheel.

Hydropneumatic Normally refers to a recoil system where the gun recoil is controlled hydraulically and the recuperator returns the gun to the firing position by the use of gas compression.

Laying The process of aiming the gun; hence the person who aimed the gun was the layer.

Morse taper A very finely machined tapered spigot. It fits into a tapered funnel and ensures a very tight fit.

Open sights A firing position in which the gun aims directly at the target.

Recuperator The part of the recoil mechanism of a gun that returns the gun to its original firing position after it has recoiled.

Striker case The mechanism which holds the firing pin in the breech block and normally consists of a spring and case assembly that can be removed from the breech, thus disabling the gun.

Trail The rear portion of a gun carriage that, in anti-tank guns, incorporates two legs that normally rest upon the ground known as trail legs. Where the trail was formed in this way the legs could be splayed out upon pivots and they were known as split trail guns.

Travelling lock A mechanism that clamps the elevating parts of the gun in position whilst travelling and prevents their being damaged.

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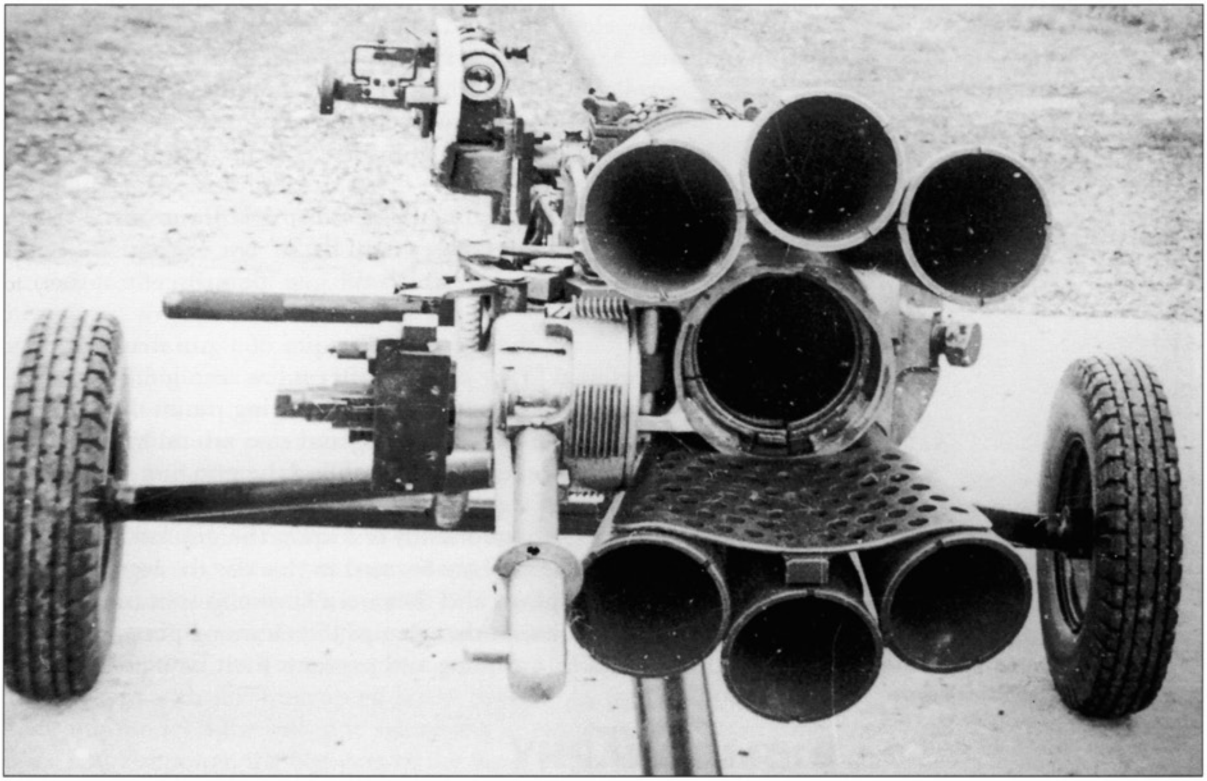


The 3.7in. Burney gun viewed from the rear with the breech open. It was accepted for trials with the British Army in 1945. (Royal Armouries Thurston Collection)

A: 2-PDR AT GUN MARKS I AND II MOUNTING

The Mark I carriage was similar to the Mark II but the Mark II was made with different manufacturing processes and with many refinements.

The Mark I mounting at the top of the page shows front and rear views. The trail legs were made of welded box section and in early prototypes they ended in screw jacks. In the production model this was not so and the trail legs terminated in angled feet. The lower section of the shield is smaller than the upper to accommodate the raised wheels. The lower half of the page shows the 2-pdr Mark II mounting, although the gun barrels and recuperator systems of the guns were virtually identical. The Mark II carriage had a curved upper shield and foot pedal recess on the lower left-hand side. To the right of the layer a large support yoke was positioned above the gun barrel and to the right of the sighting telescope. The layer's seat and traversing rest were smaller and the whole bottom part of the carriage was very different in composition. The rear-facing trail leg was normally used for towing and it was the forward-facing legs that were folded up against the body of the gun. The flat feet were pierced to allow the fixing of pickets so that the gun could be fixed in position. The gun used a No. 24 Mark IV sighting telescope.

B1: HOTCHKISS 25MM AT GUN

One view of the gun as shown in the early war period. The Hotchkiss was the main armament of some of the territorial Royal Artillery regiments in 1940, including the 14th Anti-Tank Regiment when it was sent to France in that year. They were organised in 48-guns regiment consisting of four batteries. The guns were carried on 15cwt trucks.
Calibre: 25mm
Length: 392cm
Barrel length: 1.925m
Weight in action: 310kg
Muzzle velocity: 918m/sec
Traverse: 37 degrees
Elevation: -10 degrees, +25 degrees
Range: 900m
Projectile weight: 320g or 0.7lb
Width: 105cm
Height: 109cm
Ammunition types: AP (projectile 320g), AP-tracer
Penetration: 20mm at 1000yds

B2: BOFORS 37MM AT GUN

These guns were also carried on 15cwt trucks *en portee* as in the Western Desert and were the armament of such units as the 3rd Regiment Royal Horse Artillery.
Weight in action: 816lb
Length of barrel: 68in.

Breech mechanism: Semi-automatic
Elevation: -10 degrees to +25 degrees
Traverse: 25 degrees
Performance with 25oz (700g) Armour Piercing shell:
    Muzzle velocity: 2,625ft/sec (800m/sec)
    Range: 4,376yds
    Penetration: 32/500/0 degrees

C: 17-PDR AT GUN

This gun has been depicted deployed in the bocage in Normandy in 1944. The 17-pdr was one of the few British guns that could successfully attack the newer generations of German armour such as the Panther and the later Tiger tanks. The detachment here are in their drill positions. The guns were usually painted in khaki drab at this stage in the war but could often be marked with predetermined targets or ranges on the interior of the shield. The first use of the 17-pdr in Tunisia was a great success and units such as 76th Anti-Tank Regiment Royal Artillery were amongst the first to use the 17-pdr in action. In Normandy the guns were towed by a variety of vehicles including the Matador truck, the Scammel artillery tractor, the Morris C8 and even some tracked vehicles such as the Sherman or Crusader tank specially adapted for the purpose. Because of its size and weight it was not a simple weapon to deploy quickly and although this image shows the detachment in their theoretical positions it would be far more likely to have the gun in a prepared position.

D: 6-PDR AT GUN, STANDARD AND AIRBORNE VERSIONS

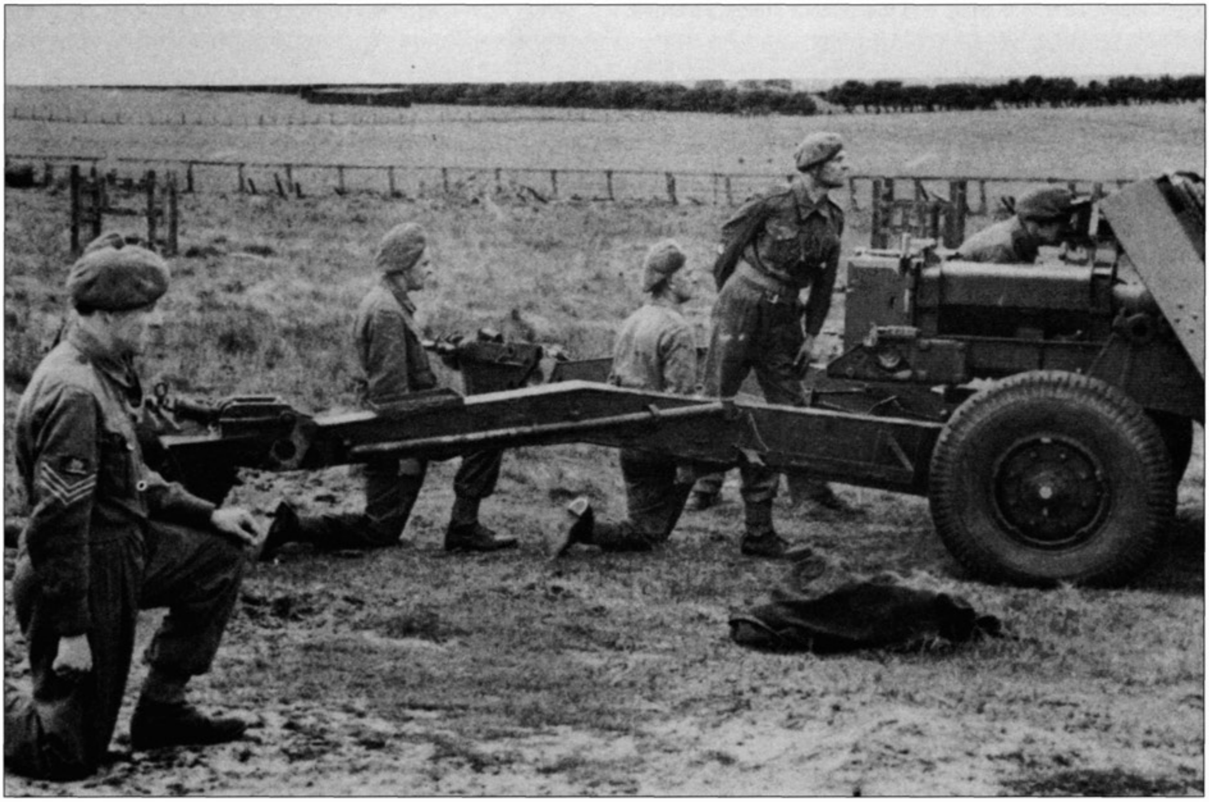
The Mark I Ordnance 6-pdr 7cwt was the standard anti-tank gun for the middle years of the war. The carriage existed in three main versions but only two, the field and airborne versions, were widely issued. In fact there were five main models of barrels and three versions of the Canadian production models, whose nomenclature was preceded by the letter C.

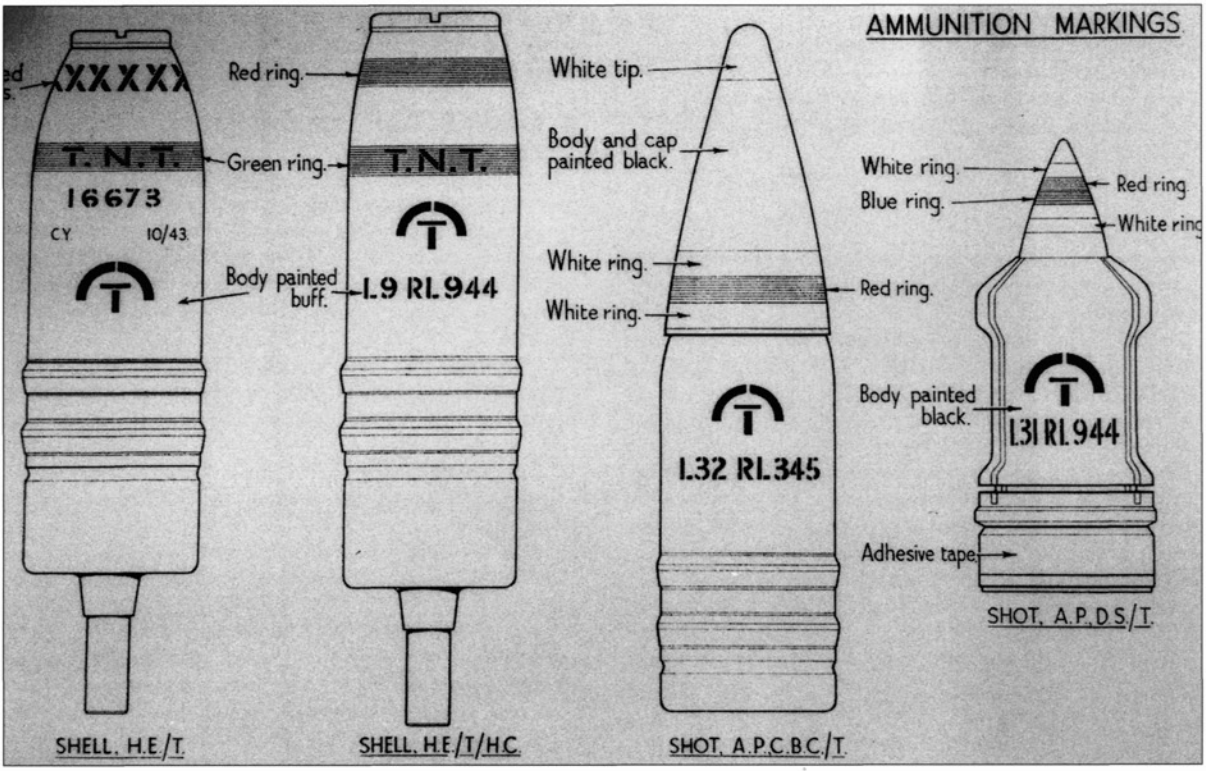
The shield was given a wavy outline on the upper edge to break up any regular lines that might make it easy to detect.

E: 32-PDR AT GUN

This was an experimental weapon which was never used but is important as it was the last large-bore anti-tank gun developed for British service. The front and rear views are taken from the only known 32-pdr in existence. In keeping with other quick-fire anti-tank guns the 32-pdr used a vertical sliding breech block. The left-hand side of the gun shows the layer's seat and operating hand wheels. The breech operating lever was on the right-hand side. As with all these weapons, ancillary tools and equipment were attached to the shield and in this case they are attached to the front shield for travelling. On this gun the muzzle brake appears to have been fitted whereas other images of the 32-pdr show it merely with a counterweight. There were many similarities

The 17-pdr deployed post-war on the ranges. There are six members of the detachment shown here in their drill positions. The Number 1 cannot be seen but stands to the rear of the gun. (Courtesy RAHT)





Ammunition for the 17-pdr gun showing the various colour schemes that denoted the type of projectile. On the left is a high-explosive tracer shell, and the armour piercing capped, ballistic capped tracer projectile is second from the right, while on the extreme right is an armour piercing discarding sabot projectile with tracer. Tracers could be somewhat problematic in the battle field as the Germans were sometimes able to detect a hidden gun as it fired a tracer round. (Author's photograph)

between the 32-pdr carriage and the 17-pdr gun carriage except that the gun could be run back so that it was put in a travelling position. The gun was tried on a self-propelled gun mounting known as the Tortoise, a suitable name since it weighed 78 tons.

F: RECOILLESS WEAPONS 7.2IN. RCL AND 95MM RCL

The guns developed by Dennis Burney at the end of the war. Although they are not directly anti-tank weapons they eventually led to the BAT series of guns. The upper image is the massive 7.2in. RCL gun and the lower image is the 95mm RCL gun. Note the unusual design of the carriage that countered the violent thrust of exhaust gases backwards. The guns were originally designed to be able to destroy concrete bunkers on D-Day and afterwards, using a new design of ammunition that incorporated plastic explosive and a base fuse was to become known as High Explosive Squash Head or HESH and become one of the commonest forms of anti-tank round in the post-war period. The 95mm gun was designed to take separate loading ammunition. It weighed 2,350lb and had a vertical sliding back breech differing markedly from the 7.2in gun. The projectile itself was 25lb in weight and could be fired, like the field gun of the same name with variable charges to achieve different effects.

G: SELF-PROPELLED GUNS AND PORTEES

Three of the commonest self-propelled guns of the war: the Archer, the Achilles and the early 2-pdr portee.

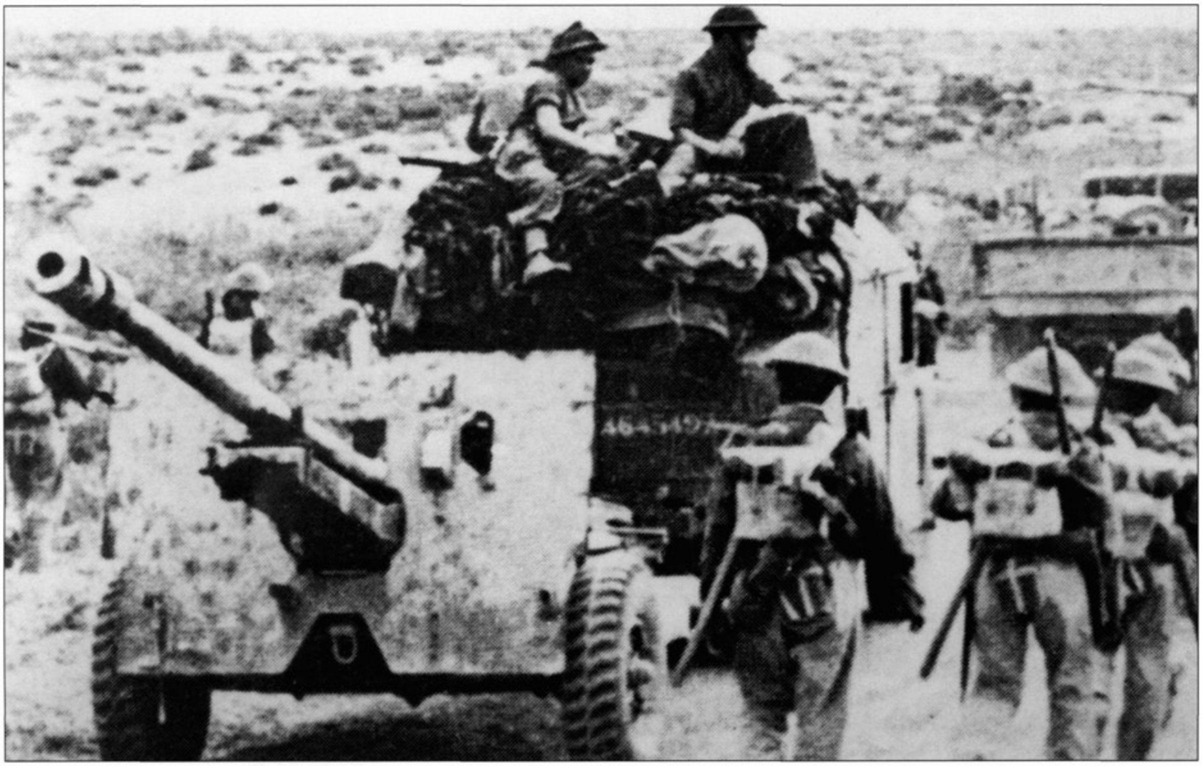
The Archer illustrated here is painted in khaki drab and is depicted as it might have appeared in 1945 in the battles for Germany.

Its rearward-facing turret led to an unusual method of using the gun since the driver always pointed the wrong way. Practical use demonstrated that the driver had to be removed before the gun could be fired.

The Achilles was the British version of the M10 tank destroyer and this one has been depicted as one of those used in the final actions of the war in 1945.

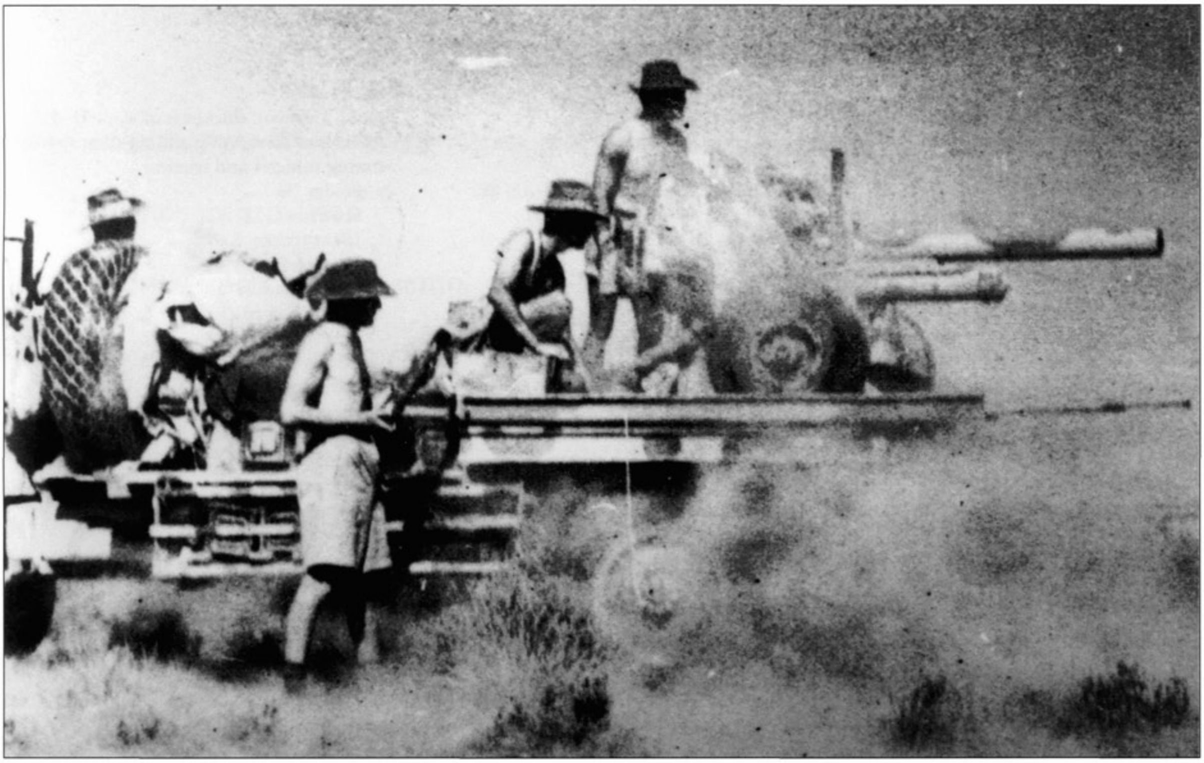
The lump at the rear of the turret is a counterweight of 2,500lb that was intended to balance the turret because the gun was long. The maximum speed of the Achilles was about 30mph, which meant that it was faster than the German tanks it was intended to kill.

The 2-pdr was mounted on the Chevrolet 15cwt truck and was deployed on the tripod with the wheels removed. In this case the truck had two rails at the end of the truck that could be used to dismount the gun if required. It was found that the 2-pdr on a portee was a highly mobile, effective gun that could support the fast mobile units at the beginning of the campaign. However the gun was easily seen from a long distance because of its regular outline and height.



ABOVE **The 17/25-pdr in Tunisia in 1943. Note the shape of the muzzle brake. (IWM)**

BELOW **A 6-pdr on a portee vehicle in the Western Desert operated by Australian personnel. (IWM)**



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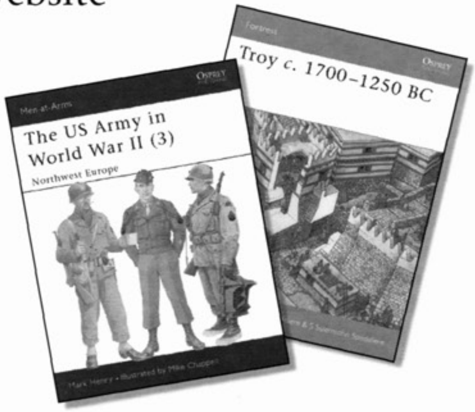
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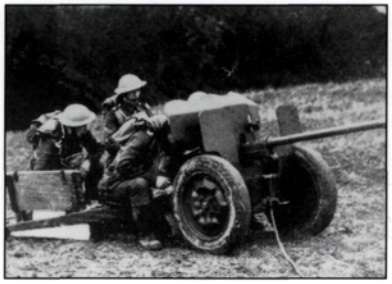

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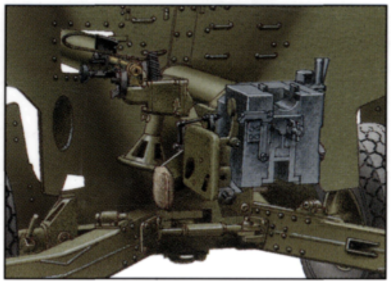

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